# An Inventory of Cold Climate Research & Design

*Prepared for*
*The Ministry of Municipal Affairs and Housing*

April, 1983

Ministry of
Municipal Affairs
and Housing
Ontario
Hon. Claude F. Bennett, Minister

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*Housing Renovation and Energy Conservation Unit*

April, 1983

## FOREWARD

During the past few years, there has been a growing interest and awareness in North America about the impact that climate has on our communities and how we behave and live. In Canada, the impact is significant because of the wide variations that our four seasons produced within our environment.

How can we adapt the design and type of community development which can take into account these seasonal differences in our climatic patterns? Many people, for example, prefer sunshine and warm weather to windy, cold February days. The challenge is for our community forms to respond to our warm weather needs and our cold weather needs. Can this be done?

The professionals and other individuals promoting these discussions have named the issue as the "livable winter city concept". For the major question is how can we adapt our communities to the colder climatic environments? We have been doing a reasonably good job in responding to warm weather conditions but we are lagging behind in understanding and dealing with the challenges of the winter seasons.

This catalogue represents an important achievement: it is the first comprehensive attempt at assembling a list of projects and people concerning some aspect of the "livable winter city" issue. The hope is that this catalogue will generate a broader discussion of these ideas, techniques, approaches and lead to more formidable development of "winter city" concepts.

# ABSTRACT

This research project, conducted by the Ryerson Northern Climate Design Workgroup, is a directory of current demonstration projects, research, programs and individuals involved in the field of designing for cold climates. The directory was compiled to increase awareness of the existence of the Cold Climate Movement and the people who work in it. A compendium of individuals included in building energy conservation and cold climate design, both in near and far northern cities and communities, will aid those who want to make their winter cities and towns more livable during winter months.

Lists of individuals and research in the area was collected from a search of literature and a mail survey. The mail survey contacted people working for the development of winter cities and towns in North America. The scope was broadened to include contact with those working in energy conservation for building design and site planning in northern climates because conserving energy is very much a part of adapting to a severe climate. By gathering as much associated material as possible, a solid reference guide for further research into cold climate happenings is provided.

Prepared by

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# INTRODUCTION

Canadians spend over one-third of the year immersed in cold temperatures. Despite this reality, involvement in Cold Climate Design has been extremely limited. Only a handful of architects, developers, engineers, and planners have begun to create structures and environments which have been designed specifically to take into account the limitations and opportunities that northern temperatures afford. To a considerable extent, the lack of innovation in this important area can be attributed to the historical advantage that all Canadians have enjoyed in the large variety of available energy types and in the privilege of low energy costs. Over the past decade, however, real energy prices have risen dramatically and it is apparent that the trend will continue, largely because the marginal costs of replacing conventional fuel supplies will be great. The consequences are particularly significant to Canadians because considerable investment must go into heating and cooling structures in cold climates.

This energy scenario implies that future strategies must emphasize conservation practices. At the same time, it is clear that they must be compatible with Canadian life-styles and it is unlikely that Canadians will tolerate policies that will require drastic alterations in their traditional energy consumption behaviour.

A survey of existing research shows that the prospects for improving design in cold climates are good. Northern climates can be made more "livable" through the combination of developments such as enclosed shopping malls, domed stadiums, plant-filled atria and covered walkways. Moreover, acknowledgement of climatic constraints will lead to designs which will utilize energy in a more efficient manner.

Towns such as Hornepayne, Ontario and Fairmont, Quebec are moving towards the goal of a livable winter and summer town. They both have had new developments injected into their systems which have brought stability and a better way of life to their residents. Hornepayne has created a town under one roof that makes a wide range of goods and services available in a climate-controlled environment. Fairmont was designed with climate in mind, a town centre positioned in such a way as to protect the residential part of the town from bitter winter winds and snow drifts. Other towns should follow their examples and begin designing living spaces that have been adapted to harsh climates.

As society becomes increasingly convinced of the advantages of cold climate design, opportunities will undoubtedly be created for the architectural, planning, engineering, development and construction communities. Similarly, the academic, recreation, and advertising sectors will be presented with new challenges in researching the factors that influence public attitudes and decisions when judgements are made about their energy consumption practices. In order to cultivate the market for climate-oriented products and services, it is merely necessary to recognize and exploit the winter spirit potential.

## PURPOSE

This directory is a response to the lack of comprehensive and readily available information about the efforts of Canadian and American design professionals to design our communities for four-season comfort. It consists of names, addresses, products and design projects of individuals involved in the area of cold climates and is intented to serve as a reference work for the private and public sectors. The study of energy conservation methods and design details that succeed in the prevention of energy loss and building deterioration is necessary for northern climate areas because this knowledge, if intelligently applied, will improve the efficiency of our living environments.

## METHODS OF COMPILATION

Information about activities in cold climate design was obtained from three main sources. First, several surveys, inventories and studies have already been completed in the general field of energy conservation and innovative design technologies. This study draws upon many of these sources in order to provide users with convenient access to both Canadian and international activities.

Secondly, an extensive literature search was undertaken throughout journals that report in the energy field. This involved both physical search and the use of computerized bibliographic information systems. Principal bibliographic computer sources were Energyline and Enviroline of the University of Toronto information services, and the U.S. DOE's Technical Information Centre in Oak Ridge, Tennessee. In addition to these bibliographic information services, energy review, conference proceedings, journals, government publications, bibliographies, published bibliographies, abstracts and publication lists were consulted.

Thirdly, a mailing list of individuals, companies, and institutions was compiled from a variety of sources. Planning, architectural and professional engineering associations across Canada and the Northern United States were contacted for their membership lists.

The Ontario Ministry of Colleges and Universities provided the names of academic institutions throughout Canada, and the U.S. university and college calendars were consulted. In all Canadian and northern U.S. universities, the Departments of Civil and Mechanical Engineering, Physics, Urban Planning, Geography, and Environmental Studies were contacted.

The equivalents of provincial ministries of Energy, Environment, and Housing were contacted in each province and northern states to provide an indication of their activities in this field. Major Canadian Municipal and Regional Planning offices were contacted for an indication of recent development projects or consultants involved in winter city design in their jurisdictions.

Key officials of the Federal and Provincial government kindly supplied names of individuals having possible involvement in design and construction of energy-efficient structures. A mailing list of those people and companies that share an interest in housing development in Ontario was provided by the Ministry of Municipal Affairs and Housing. Government telephone books were used to provide additional names of involved personnel in the civil service. This was supplemented with a search of publications, directories, and periodicals at the Ryerson Energy Information Centre, the University of Toronto Library, and government bookstores.

All the lists gathered were assembled to create an extensive registry of 5000 names of individuals who have contributed to design, planning, research, construction, and manufacturing in cold climate environments. A mail-back questionnaire was sent to each to obtain information on the projects and services specifically focused on their cold climate activities.

## GUIDELINE TO DIRECTORY USE

The information received from the respondents has been organized on the basis of 31 energy themes. Each theme is then further subdivided into 9 activity areas.

### Energy Themes

- Energy Based Urban Design
- Solar Design
- Solar Construction
- Solar Components
- Solar Testing and Analysis
- District Heating
- Wind Energy Design
- Wind Energy Products
- Wind Energy Construction
- Wind Energy Research
- Information and Educational Services
- Conservation and Renewable Energy
- Occupant and Psychological Effects
- Retrofitting Products
- Retrofitting Design
- Retrofitting Construction
- Retrofitting Research
- Earth Shelter Housing
- Heating, Ventilation and Air Conditioning
- Air Management Systems and Energy Audits
- Structural, Mechanical and Electrical Methods
- Grants and Financial Aid
- Conservation Design
- Conservation Products
- Conservation Construction
- Conservation Research
- Legislation and Official Plans
- Biomass and Geothermal Development
- Climatology
- Transportation
- Utility and Sewage System Design

### Activity Areas

- Federal, Provincial/State and Municipal Governments
- Research Institutions
- Architectural Firms
- Consulting and Engineering Firms
- Manufacturing Firms
- Development and Construction Companies
- Equipment Supply Firms
- Information and Demonstration Agencies
- Professional Associations

Entries for each specialization under individual activity categories are placed alphabetically. If a company or agency is involved in more than one aspect of cold climate activity, a cross reference to all relevant activities is provided.

As a supplement to the directory, a bibliographic listing relating to energy design and energy literature is provided. The bibliographic material has also been categorized into the following energy-related topics:

Architectural and Structural Form
Construction and Engineering Techniques
Urban Form
District Heating
Northern Design and Construction
Earth Shelter Construction
Energy Conservation
Energy Management
Environmental Impacts
Solar Design
Solar Technology
Solar Applications
Policy and Legal Considerations of Solar Energy
Financial Considerations of Solar Energy
Problems and Prospects of Solar Energy
Alternate Energy Forms
Transportation and Energy
Climatic Research
Cold Climate Psychology and Lifestyles
Energy Journals
Bibliographies and Directories

Inclusion in the report does not represent endorsement on the part of the editors. Rather, the directory is a compilation of those professionals engaged in the area of cold climate design.

# ENERGY DIRECTORY

# SECTION 1.0

# ENERGY BASED URBAN DESIGN

GOVERNMENT (FEDERAL)

NATIONAL RESEARCH COUNCIL
OF CANADA

Montreal Road
Ottawa, Ontario. K1A 0R6
(613) 993-9101

The N.R.C.C. has carried out a study of Canadian needs for research and development of Northern engineering. It has also produced an inventory of the current capability in Canada to do this type of work. A Committee of three from government guided the study. Five topics were considered and they included:

1. Northern settlements
2. Resource development
3. Major engineering works
4. Oceans engineering
5. Transportation and communications

This study was carried out for the Ministry of State for Science and Technology.

GOVERNMENT (PROVINCIAL/STATE)

PROVINCE OF B.C.
MINISTRY OF MUNICIPAL AFFAIRS

Contact: Gary Paget

Policy and Research Branch
747 Fort Street
Victoria, British Columbia
V8W 3E1

The Ministry has an interest in energy efficiency strategies and cold climate building design from four perspectives: well-managed municipal government (energy-efficient operations); physical planning (energy-efficient community planning and subdivision design); community services (energy-efficient physical services and waste management), and building standards ( energy-efficient construction).

Recent projects conducted by the B.C. Ministry include:

1. Fuel for Thought: A Primer on Energy Management for Local Government. This is a general guide to the municipal role in energy management prepared jointly by the Ministries of Municipal Affairs, and Energy Mines and Petroleum Resources staff.

2. Tumbler Ridge Northeast Sector B.C.: Conceptual Plan Update. The Ministry was responsible for the planning of the new community of Tumbler Ridge (a coal town) currently under construction in the northeast region of the Province. Energy considerations were built into the planning and in 1977, a special energy study was undertaken by R. Selvage of Bowie Keefer and Associates. Four energy related studies are being prepared for the District to explore the feasibility of muncipalities conserving energy during the construction of Tumbler Ridge.

Refer also to sections 3.0 and 8.2

## GOVERNMENT (MUNICIPAL)

### THE CITY OF LONDON

Contact: Mr. J.R. Tikalsky

Dept. of Planning and Development
300 Dufferin Avenue, P.O. Box 5035
London, Ontario. N6A 4L9
(519) 679-4980

The City of London is presently involved in energy conservation strategies at the community land use pattern level. Their focus is on subdivision design and site planning policies.

Please contact Mr. Tikalsky for more detailed information.

### THE CITY OF WINDSOR

Contact: Jon K. Atkins

Department of Planning
Room 400, City Hall
Windsor, Ontario. N9A 6S1.
(519) 255-6281.

The Department of Planning is involved in the following projects:

1. Energy - Urban Planning and Design
2. Windsor Energy Profile - A Pilot Study
3. Windsor Study - Energy Conservation through Land Use Planning.

## RESEARCH INSTITUTIONS

UNIVERSITY OF WATERLOO
Dept.of Man/Environment Studies
Faculty of Environmental Studies
Waterloo, Ontario.
N2L 3G1
(519) 885-1211

Contact: Mr. John Robinson

An Experience '82 Grant from the Ministry of Energy to the University has provided funding for a detailed analysis of the technical and economic potential for energy conservation in housing to the year 2001 in Kitchener. The data are disaggregated by housing type, age, fuel mix and insulation levels. A simulation analysis and comprehensive data base for Kitchener is expected to lead to specific recommendations about urban energy conservation programs.

YORK UNIVERSITY
Faculty of Environmental Studies
4700 Keele Street
Downsview, Ontario. M3J 2R2
(416) 667-3967

Contact: Prof. Reg Lang

The Faculty of Environmental Studies has produced seven recent reports on community energy planning/management.

1. "Energy Conservation and the Municipal Planner." February 1980.
2. "New Directions in Municipal Energy Conservation: The California Experience." January 1980.
3. "Sourcebook: Energy Conservation in Twenty Canadian Cities." January 1980.
4. "Information Resources for Municipal Energy Planning and Management." September 1980.
5. "Planning Land to Conserve Energy: 40 Case Studies from Canada and the United States." 1981.
6. "Transportation and Energy Conservation in Ontario Municipalities. Vol. 1: Summary." November 1981.
7. "The Community Energy Profile: Concepts, Methods, Applications." March 1982.

For further information contact: Audrey Armour; Lang Armour Associates. P.O. Box 580, Aurora, Ontario. L4G 3L6. (416) 727-4177.

## ARCHITECTURAL FIRMS

**COLIN BENT ARCHITECT**
Contact: Colin Bent

280 Bloor Street West, Suite 106
Toronto, Ontario. M5S 1W1
(416) 960-5522

The architect specializes in accommodation design for northern and remote communities. Projects have included:

1. Polaris project which provided complete accommodation facilities for a mining town on Little Cornwallis Island, N.W.T. The facilities included 240 rooms or suites, dining and lounge facilities, swimming pool, gymnasium, offices, and mechanical support facilities.
2. Echo Bay Mine study which designed an accommodation facility for a mining town north of Yellowknife, N.W.T.
3. Feasibility study for Canada Wide Mines to re-organize existing accommodation and alleviate employee hardship. The mining town is located in Northern B.C.
4. Matrix Accommodation System was a study to produce a proto-type facility for remote northern industrial communities.
5. Cold Lake Temporary Housing was a design study for a new accommodation system and configuration of camp facilities for 8,000 men.
6. Modulok Building System was a design development proposal to develop aesthetic and technical solutions for a pre-fabricated housing system utilizing glass reinforced concrete for use in all climates.

**JOHN HIX ARCHITECTS**
Contact: John Hix

282 Borden Street
Toronto, Ontario. M5S 2N6
(416) 533-8529

The firm has been involved in the exploration and implementation of planning, design, and construction techniques geared to the conservation of energy in buildings emphasizing architectural solutions to energy conservation. The firm incorporates the principles of building orientation to the sun, high insulation standards, natural ventilation, seasonal shading, etc.

Some of the recent projects conducted by the firm include:

1. Report for the Royal Commission on Electric Power Planning concerning energy, land use, passive solar and climate design, and urban form.

cont....

ARCHITECTURAL FIRMS (continued)

2. Energy overview on two Ontario new towns (Townsend and Pickering).
3. Plan for South March energy town near Ottawa based upon passive solar, climate design and district heating demonstrates major land and energy savings compared with conventional planning.
4. Energy needs study for housing at Frankel/Lambert commissioned by City of Toronto Housing Department describing varying orientations and cost benefit analysis for passive solar heat gain and energy conservation techniques.
5. Energy strategy for mass transit station areas in Edmonton discusses density, land use, geometry, orientation, passive solar, transportation and communication.
6. Report for the Ontario Ministry of Energy discussing potential transferability of district heating to the Ontario architecture and planning context based on a two-week study in Scandinavia.
7. Production of an up-to-date guide into the existing studies, surveys, programs and publications related to energy conservation in multiple dwelling buildings for Office of Energy Conservation, EMR Canada.
8. Design of active solar buildings including McClintock "Sun House" townhouses in Scarborough.
9. Design of numerous passive solar buildings.
10. Ontario Ministry of Energy study demonstrating that "conventional" subdivision plans can be rearranged to provide for solar access for future passive and active solar homes.
11. Design of three 30-unit dormitories in Atikokan, Ont.

THE LANDPLAN COLLABORATIVE LTD.

128 Woolwich Street, Suite 204
Guelph, Ontario. N1H 3V2

The firm specializes in site design for energy conservation, land management techniques, low maintenance and low energy consumption landscapes, microclimatic analyses for design, and snow and wind consideration for design.

In a recent project, the firm has studied planning for energy conservation considerations, implications, techniques and process. They identified the impact of energy conservation planning as it affects private development and strategies for implementation consistant with municipal development process and development concerns.

Refer also to sections 15.0 and 17.0 for more information on the firm's projects.

## ARCHITECTURAL FIRMS (Foreign)

**ENERGY CONSCIOUS DESIGN**

44 Earlham Street, Covent Garden
London, ENGLAND. WC2 9LA
(01) 240-0566

Contact: David Turrent

The firm offers architectural and energy consulting services. One recent project (1980) is the Giffard Park Site II which will provide accommodation for 92 single people in shared flats. The site is located in Milton Keynes and will consist of four 2-storey terraces. The design maximizes use of passive solar gains for space heating and will incorporate high levels of thermal insulation, eight thermo-syphon solar water heating systems and a low consumption air heating system.

## CONSULTING AND ENGINEERING FIRMS

**DILLON CONSULTANTS AND PLANNERS**
47 Sheppard Avenue East
Willowdale, Ontario
Contact: Daniel Paquette
(416) 229-4646

The firm is involved with many aspects of energy-efficient designs.

Examples of projects include:

1. Energy Study, City of Guelph.
2. Energy Study, City of Windsor.
3. Burwash Land Use Study, Ministry of Government Services.

For additional information on the firm's projects refer to sections: 2.1, 3.0, 4.1, 6.0, 8.0, 11.0, 15.0, and 18.0.

**FLETCHER ASSOCIATES**
64 Grenview Blvd. North
Toronto, Ontario. M8X 2K4
(416) 239-7632 or 961-4736

This consulting engineering and planning firm has been involved in design studies for municipal services and complex buildings in Northern Mining Communities. Their projects have been funded by federal, provincial and municipal governments in addition to the resource industry.

**HOUGH, STANSBURY + MICHALSKI LTD.**
63 Galaxy Boulevard, Unit #1
Rexdale, Ontario. M9W 5R6
Contact: Mr. Michael Hough
(416) 675-6353

The firm specializes in master planning, terrain and aquatic analysis, site design and resource management supervisory services. Their projects involve environmental and site planning concerns. Their project inventory is as follows:

1. Study for CMHC (1976) to determine whether autonomously serviced settlements can be built in Canada now, with technologies already on the market, whose purpose would be to shift the dependence of housing from non-renewable to renewable resources. Completed in association with:
   Robbie Williams Kassum - architects
   The ECE Group/Damas & Smith - consulting engineers
   Scanada Consultants - building research

cont....

## CONSULTING AND ENGINEERING FIRMS (continued)

Currie Coopers & Lybrand - management consultants
Envirogetics - solar energy consultants

2. CMHC Study for Le Breton Flats, Ottawa. Hough, Stansbury + Michalski Ltd. developed the detailed design of the streetscape and local park of phase 1 of the neighbourhood renewal project in Ottawa. The park concept included the development of year-round recreational areas for a wide variety of age groups.

**IBI GROUP**

Contact: Harold J. Katzin

156 Front Street West, 6th Floor
Toronto, Ontario. M5J 2L6
(416) 596-1930

The firm specializes in the areas of transportation and communications, infrastructure, land development facilities, energy management, management and computer sciences. Projects in the area of urban land development and infrastructure include:

1. Solar Feasibility Study for the Manitoba Housing and Renewal Corporation consisting of the application of solar energy to domestic hot water heating for 5 mid-rise apartment buildings.
2. Silver Springs Passive Solar Feasibility Study carried out for the City of Calgary Housing Corporation on 31 housing units.
3. Iroquois Ridge Subdivision located in Oakville for Carma Developers Ltd. studied the solar accessibility of lots zoned for detached, semi-detached and zero lot line housing.

For a further description of the firm's projects, please refer to sections 2.1, 2.2, 5.0, 8.4, 11.0, 14.1, 14.3, and 14.4.

**MARSHALL MACKLIN MONAGHAN LIMITED**

Contact: D.W. Beasley

275 Duncan Mill Road
Don Mills, Ontario. M3B 2Y1
(416) 449-2500

Refer to section 14.1 for a detailed description of the firm's services and projects.

## CONSULTING AND ENGINEERING FIRMS (continued)

PROJECT PLANNING ASSOCIATES LTD
111 Avenue Road
Toronto, Ontario. M5R 3K1
(416) 925-1411

Contact: Mr. K. Frank

The firm is involved in all aspects of regional and urban planning, environmental design and development. The firm is continuously making efforts to incorporate energy efficiency into the design process. The projects the firm is involved with are in the area of:

1. Official plans
2. Subdivision design and analysis
3. Open space system and recreation facility planning
4. Site planning, program evaluation, and streetscape design
5. Environmental analysis of subdivisions.

## DEVELOPMENT AND CONSTRUCTION COMPANIES

HALLMARK HOTELS LTD.
Contact: Ernest L. Balmer

45 Charles Street East
Toronto, Ontario
M4Y 1S2 (416) 964-9191

The provision of housing and community amenities to attract and maintain employees in remote locations at a sensible bottom line cost, has long been an extremely difficult task, one which has been met with only haphazard success. Hallmark's 10 years of research and development experience in the field of employee comfort facilities (from small to large projects) have enabled them to provide new, useful and money-saving techniques that benefit corporations, governments and the people who live in Canada's resource communities.

The Hallmark Hornepayne Town Centre. As a "multi-use town within a town," the Centre contains 166,000 sq.ft. of ultra-modern climate-controlled environment. It houses CN Railways employees in 120 units and there are 16 senior citizen units and 20 rental units. In the past, the severe winter climate and geographic location created a number of interrelated problems. Most services (such as medical, dental and libraries) tended to be thinly spread. Schools could not easily remain open for community use. It was difficult to attract and maintain employees due to a lack of basic amenities. The Centre was conceived as a prototype for the 'domed city of the future' at a cost of $12,500,000. The Centre is a result of cooperation between federal, provincial governments, CN, Hallmark Hotels Ltd. and local initiative. For the first time in Ontario it combines housing, hotel, community, recreational, retail, medical, educational and cultural facilities under one roof in a climate controlled environment.

The Centre Inn hotel contains 34 luxury, air-conditioned rooms with bath-shower, direct-dial telephones, colour TV and room service. A lounge bar, dining room, entertainment lounge, coffee shop and standup bar and disco are also available. The Centre provides an indoor swimming pool and gymnasium for public use, a high school and a public library. It also provides a medical-dental centre with full facilities, an Ontario Provincial Police detachment, an LCBO liquor store, a post office, branch bank, supermarket, variety store, retail stores and a Hudson Bay store. In addition, a wide range of summer outdoor recreational facilities are provided, including a softball diamond, soccer fields, running track and tennis courts.

# SECTION 2.0

# SOLAR TECHNOLOGY

# SECTION 2.1

# DESIGN

## GOVERNMENT (FEDERAL)

**THE HOUSING AND URBAN DEVELOPMENT ASSOCIATION OF CANADA (HUDAC)**

15 Toronto Street, 10th Floor
Toronto, Ontario.
M5C 2E3.

Contact: Mr. Howard French

See Section 5.0 for description of contractors involved in solar design of homes.

**PUBLIC WORKS CANADA**

201 - 269 Main Street
Winnipeg, Manitoba.
R3C 1B2.

Contact: Energy Department

The Energy Department of Public Works Canada specializes in energy conservation. In addition to involvement in the area of retrofit design, the Energy Core is also involved in solar heating design.

**GOVERNMENT** (PROVINCIAL/STATE)

SASKATCHEWAN HOUSING CORPORATION

2500 Victoria Avenue
Chestemeier Place
Regina, Saskatchewan. S4P 3V7
(306) 565-4177

Contact: Dave Edward

The agency provides all architectural designs as well as consulting advise for retrofit design and other technical problems of passive solar energy techniques.

Projects include:

1. Various houses and senior citizens homes
2. Six houses for energy retrofit (Saskatchewan Research House).

## RESEARCH INSTITUTIONS

### UNIVERSITY OF ALBERTA

Department of Physics
Edmonton, Alberta. T6G 2J1

Contact: F.L. Weichman

The university's Physics and Plant Science Departments are conducting research on Channelled Plastic for Greenhouse and Skylight Use. The research involves the design and testing of transparent, channelled, plastic sheets which lend themselves to solar energy applications where an interior space needs light but limited amounts of heat. The heat energy can be collected and used separately in greenhouse and skylight applications. Reduced ventilation needs in greenhouse applicatons permit controlled atmosphere that result in enhanced growth rates.

The research is funded by the Alberta government and the NSERC.

### B.C. RESEARCH

3650 Wesbrook Mall
Vancouver, B.C. V6S 2L2
(604) 224-4331

Contact: Mehrzad Movassaghi

A testing facility for solar equipment is to be designed, built, and commissioned through funds from the NRC's Solar Energy Program.

### SOLAR APPLICATONS AND RESEARCH LTD.

3683 West 4th Avenue
Vancouver, B.C. V6R 1P2
(604) 733-5631

Contact: Roger Bryenton

Refer to section 5.0 for a more detailed description of the projects and services offered by the institution.

## RESEARCH INSTITUTIONS (United States)

**UNIVERSITY OF ALASKA**

Contact: Keith B. Mather

901 Koyukuk Avenue South
Room 10, Arctic Health Bldg.
Fairbanks, Alaska. U.S.A. 99701

The university is involved in research on solar design for rural schools. Due to the fact that schools in Alaska serve a community as well as an educational purpose, the university has undertaken a research program to develop an energy-efficient school employing passive solar heating techniques. This research is being conducted in conjunction with the Alaska Department of Transportation and Public Facilities because of the department's responsibility in constructing the rural schools.

Refer also to sections 2.3, 4.1, 5.0 and 16.0 for more information on the university's research projects.

## ARCHITECTURAL FIRMS

**A.S.K. ARCHITECTS**
Contact: Stewart Kinmond

P.O. Box 1644
Yellowknife, N.W.T.
(403) 920-2200

The firm provides architectural designs of new buildings and offers financial and economic analysis.
Projects include:

1. A private residence with solar heated design
2. Single family dwelling with super-insulation, natural ventilation, wood finish rather than drywall.

**AYRES DECHERT ARCHITECTS/PLANNERS**
Contact: James P. Ayres

907 - 18 Avenue S.W.
Calgary, Alberta. T2T 0H2
(403) 245-6130

The firm offers design services in the area of passive solar energy systems and ecologically sound site planning. They have completed 6 single family dwellings.

**WILLIAM AZZALINO ARCHITECT**
Contact: Wm. Azzalino

160 Gibson Drive #14
Markham, Ontario
L3R 3K1

The firm is involved in passive solar design. Projects include:

1. A residential highrise in Markham, Ontario. The project is in the drawing stage and will cost $4.2 million. Sigma Engineering is also involved in the project.

2. The design of a passive solar office building of approximately 24,000 sq.ft.

**ALLAN BARRET ARCHITECT LTD.**

#502, 610 17th Avenue S.W.
Calgary, Alberta

Company deals with designs of energy-efficient housing and passive solar homes.

## ARCHITECTURAL FIRMS (continued)

**A.R. BAZIUK ARCHITECT LTD.**

Contact:Andrew Baziuk

10529 - 97th Street
Edmonton, Alberta. T5H 2L3
(403) 429-5786.

The company offers energy-efficient concepts and designs, passive solar energy systems and other architectural designs. Baziuk Architects also researches into developing guidelines for housing and provides consulting services. Projects include:

1. 4 energy-efficient homes
2. Restaurant bermed into a hill.

**THOMAS E. BROWN ARCHITECT**

Contact: T.E. Brown

120 Cumberland Street
Toronto, Ontario. M5R 1A6
(416) 928-0506

This company is involved in passive solar heating and energy-efficiency of buildings. Some projects include:

1. Fire Station #15, Tapscott Road, Scarborough, Ontario. A fully automated passive solar heating system commissioned by the Borough of Scarborough. The cost of the trombe wall system, which is fully operational, was $7,000.00 and it was developed by T.E. Brown, Richard Walker Engineering and Frank Pastor, Architect.
2. Fire Station #2, Meadowvale Road, Scarborough, Ontario. A modified direct gain passive solar heating system.
3. Fire Station #10, 2316 Hurontario Street, Mississauga, Ontario. Designed to make building energy efficient.
4. Future projects include a North York Fire Station (#15) and a direct gain passive solar system for an industrial plant on Hanlan Road in Toronto.

**JOSEPH ANTHONY COLONNA ARCHITECT**

Contact: J.A. Colonna

94 Queen Street
St. Catharines, Ont. L2R 5H3
(416) 684-6881

The architect has been involved in design for winter climate conditions. Mr. Colonna was once part of a design and research company called "Allsun Energo" which designed a residence in Thorold, Ontario. The residence had an active solar system with a heat pump-water source back-up. The company became defunct in October 1981 due to lack of funds.

cont....

## ARCHITECTURAL FIRMS (continued)

Recently, Mr. Colonna has been engaged in developing a viable greenhouse heat source design for passive applications in new or existing buildings. The greenhouse will supply warm air to precast concrete floor slabs and a trombe wall which will be blown into conventional heating ductwork of the building.

### CONCEPTS, DESIGN AND DRAFTING

11118 - 124th Street, Suite 4
Edmonton, Alberta.
(403) 452-1969

Contact: Fred Mallach

The firm offers complete detailed design of active solar housing and consulting services on residential houses with additions and pools. They have completed 6 projects (all private residences).

### R.G. COOPER ARCHITECT

Waden Bay
La Ronge, Saskatchewan.
(306) 425-2292

Contact: Gary Cooper

The architect designs insulation systems, glazing systems and active collector systems. Services also include cost analysis and financial/economic analysis.

Projects include:

1. Private residence (conservation house)
2. School
3. Meat Processing Plant.

### ENG AND WRIGHT PARTNERS

1650 Alberin Street
Vancouver, B.C. V6G 1A6

Contact: Martin Bruckner

The firm has been involved in the design of passive research laboratories for the Department of Fisheries and Oceans. The laboratories utilize conservation techniques such as insulation, vapour barriers, orientation and landscaping, natural ventilation techniques, zoning within facility for reduced energy demands, and heat reclamation through use of heat exchangers.

## ARCHITECTURAL FIRMS (continued)

GERALD L. FORSETH ARCHITECT
208-17 Avenue S.E.
Calgary, Alberta. T2G 1H4
Contact: G.L. Forseth
(403) 265-0696.

Gerald Forseth is primarily involved in solar-oriented and retrofitting design.

Projects include:

1. 12 urban oriented single family dwellings - all passive solar design.
2. Light industrial, office, warehouse development.
3. Historic Burns Building - Atrium building retrofit.
4. Sandstone Court House - Retrofit energy and fuel consumption.
5. Teaching design with energy conservation at the University of Calgary.

G.M. GERRIE ARCHITECT
45 Arkledun Avenue, Apt. 702
Hamilton, Ontario. L8N 2H6
Contact: G.M. Gerrie
(416) 522-5645.

Specializes in economical energy-conserving residential and small building design for cold climates, with particular emphasis on the design of building envelope (air-tightness, insulation, and earth sheltering) and passive ground-to-air exchange. Mr. Gerrie has also presented seminars on Solar and Earth Housing Design at Mohawk College.

Examples of Projects include:

1. A one-and-a-half storey basementless brick-veneered wood-frame residence at 34 Balfour Drive, Hamilton. The home is an example of an air-tight super-insulated structure (R33 walls, R40 roof) utilizing passive solar capabilities for heating and cooling. Completed June 1982.

See section 9.0 for a further description of projects.

ROSS E. HAYES ARCHITECT
5th Floor, 205-9th Avenue S.E.
Calgary, Alberta. T2G 0R3
Contact: Ross Hayes
(403) 264-9740.

The architect primarily designs and consults but has endeavoured to research into passive solar techiques.

cont....

## ARCHITECTURAL FIRMS (continued)

Projects include:

1. Various passive solar designs.
2. Nu-West passive designs.
3. Research stating 4 ways of combining passive solar collection.

**JOHN HIX ARCHITECTS**

Contact: John Hix

282 Borden Street
Toronto, Ontario. M5S 2N6
(416) 533-8529

Refer to section 1.0 for a detailed description of the firm's services and projects.

**TANG LEE ARCHITECTS LTD.**

Contact: Tang Lee

2500 University Drive
Calgary, Alberta. T2N 1N4
(403) 284-6608.

The firm specializes in the field of energy-efficient designs and planning.

Projects include:

1. Calgary Chinese Alliance Church.
2. King's Fold Greenhouse in Cochrane, Alberta using active solar heating planting beds.
3. Approximately 12 single family dwellings across Canada.
4. Energy management and retrofit techniques to conserve energy in Alberta schools.

**R.D. LINES ARCHITECT**

Contact: R.D. Lines

10917-81 Avenue
Edmonton, Alberta. T6G 0S1
(403) 432-7054

The architect specializes in design and consulting aspects of energy-efficient designs.

Projects and Services include:

1. 2 private residences - both passive solar systems.
2. Economic and feasibility studies concerning energy-efficient designs.
3. A book entitled "The Rational House."

## ARCHITECTURAL FIRMS (continued)

**MACLENNAN ASSOCIATES ARCHITECTS**

Suite 101, Executive House
275 Ontario Street
Kingston, Ontario. K7K 2X5

The firm specializes in the restoration of older buildings as well as in the design of both passive and active solar structures. The company is also actively pursuing energy conservation in all projects undertaken, by using suitable passive features such as heat pumps and heat energy recovery apparatus.

Recent projects include:

1. Cornwall Island Indian Day School.
2. The Briars, Jackson's Point.
3. The Marine Museum of the Great Lakes, Kingston, Ont.
4. Ontario Government Building, Kingston.
5. Several residences, churches and commercial buildings.

**CHRIS MAKEPEACE**

9733 - 89 Avenue
Edmonton, Alberta. T6E 2S1
(403) 432-9210

Contact: Chris Makepeace

Refer to section 11.0 for a detailed description of the firm's services and projects.

**MATSUI BAER VANSTONE FREEMAN ARCHITECTS**

3 Church Street, #601
Toronto, Ontario. M5E 1M2
(416) 363-5007

The firm designed the passive solar domestic hot water system for the Men's Residence of the University of Eastern Africa, Baraton, Kenya. Commissioned by the Seventh-Day Adventist Church, Washington, D.C. Funded by C.I.D.A. at a cost of $70,000.00.

Also completed was the Wallace Emerson Community Recreation Centre, Dufferin Street, Toronto. It uses an active solar system for generating hot water for domestic use and heating a swimming pool. Commissioned by the City of Toronto, the implementation cost was about $120,000.00 and the consulting Mechanical Engineers were Hooper & Angus Ltd. of Toronto.

## ARCHITECTURAL FIRMS (continued)

**MICHAEL C. MILLER ARCHITECT**
63 Yorkville Ave., 3rd Floor.
Toronto, Ontario. M5R 1B7
Contact: Michael Miller
(416) 968-0421

Designs to normal insulation, heating and cooling standards utilizing present technology such as heat pumps, insulated glazing, and passive solar heating.

**PETER C. PIVKO ARCHITECT**
326 Somerset Street West
Ottawa, Ontario. K2P 0J9.
Contact: Peter Pivko
(613) 234-4445

Involved in the following projects:

1. Advisor to Department of Public Works on all solar panel hot water heating systems to the National Capital area.
2. Design of Atrium as a solution to cold weather office project in Syracuse, New York.
3. General architecture involving cold climate building design to various buildings.

**GILBERT M. REKKEN AND ASSOCIATES**
105, 10235- 124th Street
Edmonton, Alberta. T5N 1P8
Contact: Gil Rekken
(403) 482-5611

The firm provides design and consulting services in the field of active and passive solar systems. Projects include:

1. residential homes
2. Government homes
3. Post Office Building - active domestic hot water system.

**JOHN PAUL ST. JACQUES ARCHITECT**
550 8th Avenue
Thunder Bay, Ontario. P7B 2R8
Contact: John Paul St. Jacques
(807) 344-7206

The firm is involved in the design of passive solar-heated residences - 6 in the Thunder Bay area.

## ARCHITECTURAL FIRMS (continued)

**SOMFAY AND FRYETT ARCHITECTS**

122a St. Andrew Street West
Fergus, Ontario. N1M 1N5.
(519) 843-5600

Contact: Joseph Somfay

Involved in solar building design, solar design education, thermographic analysis, and architectural research and development.
Since 1979, numerous projects across Ontario have been completed either for the Government, private home owners or private concerns.

An example of completed projects include:

1. Various buildings and residences (40+) using active (site built) and passive (site built) and air-sealing techniques located throughout Southern Ontario.
2. Demonstration House in Guelph sponsored by HUDAC and the Ontario Ministry of Energy in 1980.
3. Completed the drafting of and participated in the Ontario Hydro Passive Solar Program 1981-1982.
4. Ontario Hydro Energy Conservation Guideline Brochure
5. National Research Council: Design and development of a passive solar retro-fit device.

On-going activities:

1. Architectural Solar Design Course - University of Waterloo
2. Public exhibition of Solar Design and Technology Developments at the Energy Lifestyle Show, Toronto.
3. Lecture tours for HUDAC and various school boards.

**DARRELL A. SWANSON ARCHITECT LTD.**

921-18 Ave. S.W.
Calgary, Alberta. T2T 0H2
(403) 245-5010

Contact: D.A. Swanson

The firm specializes in design and consulting services for general architecture projects as well as passive solar systems.

Projects include:

1. A school.
2. A small residential solar building.

## ARCHITECTURAL FIRMS (continued)

ASEN VITKO ASSOCIATES ARCHITECT
276 Avenue Road
Toronto, Ontario
Contact: A. Vitko
(416) 928-0220

The company is involved in the design of energy-efficient, passive solar-heated housing and commercial buildings.

A recent project was the completion of an energy-efficient residence at 9 Buller Avenue, Toronto. The cost of the project was approximately $250,000.00.

WHEELER/DOUGLAS ASSOCIATES LTD.
1288 Wellington Street
Ottawa, Ontario. K1Y 3A9
Contact: Jim Douglas
(613) 728-7563

The company of landscape architects are involved with site planning and design with specific interest in energy conservation techniques. The proper location of buildings and other uses of areas on a site (sun orientation) and the use of landscape elements (landforms and tree and shrub plantings as screens) are foremost in their passive designs.

ROY WILSON ARCHITECT LTD.
709-11 Avenue S.W.
Calgary, Alberta. T2R 0E3
Contact: Roy Wilson
(403) 265-5672.

The firm is involved in the design and consulting aspects of passive solutions for energy conservation.

Recent projects include:

1. A third prize LEBDA award for a building in Regina.
2. Substation for the City of Calgary - Heat reclaim from transformers.

ZIPPAN AND BARRETT ARCHITECTS
55 City Centre Drive, Suite 501
Mississauga, Ontario.
L5B 1M3
Contact: Stanley Zippan
Wayne Barrett
(416) 279-6667

Refer to section 14.1 for a detailed description of the firm's services and projects.

## ARCHITECTURAL FIRMS (continued)

**ZONE GUTHRIE AND ASSOCIATES**

770 Brown's Line
Toronto, Ontario. M8W 3W2
(416) 252-5679.

The architectural firm was involved in the Boulder Creek Passive Solar Demonstration Housing Project located on Lakeshore Road and Silverbirch Trail in Mississauga. The project consisted of 14 detached super energy-efficient houses. The Ontario Ministry of Energy and HUDAC contracted the architectural firm.

Other firms involved in the project were:

1. Chandos Consultants, Urban Designers and Landscape Architects
2. Cantex Builders, Developer/Builder.

## ARCHITECTURAL FIRMS (United States)

**DANNY CERVANTS TANIGUCHI ASSOCIATES**

1126 Spruce Street
Boulder, Colorado.
U.S.A. 80501
(303) 449-2450

The architectural firm designed the Sun-Ra Condominium building located in Colorado. The building has a 10,800 sq.ft. copper solar collector system. The engineering firm of Beckett Harman Associates was also involved in the project which was completed in 1975.

**CLARK & WALTER**

513 S. Union
Traverse City, Missouri.
U.S.A. 49684
(616) 946-3627.

Actively involved in earth shelter and passive solar designs.

An example of a passive solar site designed by the firm is the AuSable Trails Science Building school facility located in Mancelona, Michigan. The construction cost of the project was $250,000 U.S.

**CROWTHER-KRUSE-MCWILLIAMS**

2830 East Third Avenue
Denver, Colorado. U.S.A. 80206
(303) 355-2301

Contact: Richard L. Crowthers

The firm is actively involved in residential and commercial solar design and passive solar retrofitting design.

Projects have included:

1. Duplex (house and adjoining apartment) designed with a passive solar collector system.
2. 1-storey brick home remodelled for energy conservation and solar heating.
3. Townhouse remodelled for minimum heat loss
4. 3-level modern office building
5. 1-storey solar house connected with the Colorado State University Solar Energy Applications Lab. and funded through the National Science Foundation.
6. 2-storey demonstration dwelling with solar heating system

**ARCHITECTURAL FIRMS** (United States continued)

CHARLES HARTLING ARCHITECT
1300 Canyon
Boulder, Colorado. U.S.A.
(303) 442-1342
Contact: Charles Hartling

The architect has been involved in the design of several passive solar projects. These have included:

1. A 3-storey house in Colorado with a flat plate water system
2. A solar house that utilizes a spherical, stationary reflective concentrator.

JOINT VENTURE ARCHITECTS
1140 Detroit Street
Denver, Colorado. U.S.A. 80206
(303) 333-8997
Contact: Phillip J. Tabb

The firm has designed a hemispherical geodesic dome space which serves as a residential structure located in Golden, Colorado.

The dome incorporates a passive solar heating system through the use of a large south opening under which an indoor/outdoor pool reflects and absorbs heat.

MALCOLM B. WELLS
Box 183
Cherry Hill, New Jersey.
U.S.A. 08002
(609) 663-5423
Contact: Malcolm Wells

The architect has designed several energy-efficient structures utilizing solar energy techniques. His designs have been used in projects throughout the Northeastern United States.

Mr. Wells has also published his designs and energy-efficient strategies. His books have been included in the bibliography attached to the end of this directory.

## CONSULTING AND ENGINEERING FIRMS

**BUCHAN, LAWTON, PARENT LTD.**

Contact: Mark Lawton

325 Dalhousie Street
Ottawa, Ontario. K1A 7G2
(613) 233-7224

Under a grant from the NRCC's Solar Energy Program, the firm has prepared guidelines and a manual for installing small collector arrays on small residences in Canada.

**CHERITON ENGINEERING LTD.**

Contact: Dave Panar

700 - 5555 Calgary Trail
Edmonton, Alberta. T6H 5P9
(403) 438-3811

The firm offers mechanical and electrical design and consulting services as well as construction services of solar structures. They also offer energy audits on existing structures.

Projects include:

1. Monitoring Edmonton City Police Building
2. Design of Convention Centre underground complex, a 9-storey twin tower office-apartment complex and Drayton Valley Hospital
3. Consultation in the construction of a solar home and a solar heat-assisted office building.

Energy audit projects listed under section 11.0.

**DILLON ENGINEERS AND PLANNERS**

Contact: Daniel Paquette

47 Sheppard Ave. E.
Willowdale, Ontario
(416) 229-4646

Dillon Engineers and Planners are involved with many aspects of energy-efficient designs.

Examples include:

1. Subdivisions and Sun, Ontario Ministry of Energy.
2. Senior Citizens Project (OHC) Aylmer, Ontario

For further examples see Sections 1.0, 3.0, 4.1, 6.0, 8.0, 11.0, 15.0, and 18.0.

## CONSULTING AND ENGINEERING FIRMS (continued)

**ECODOMUS DEVELOPMENT LTD.**

Contact: Leo McCuaig

880 Wellington Street, Suite 212
Ottawa, Ontario. K1R 6K7
(613) 741-9402

The firm received funds from the National Research Council of Canada under the Solar Energy Program to conduct research on the incorporation of passive solar techniques in mass urban housing. The objectives of the project were:

1. To develop basic designs for mass urban housing that take advantage of passive and active solar gains
2. To develop a computer model that simulates the dynamic response of a house with an active heat storage system, that receives passive solar gain.

Based on the analysis, generic designs which would maximize passive solar gain and potential active solar collection, were developed for single family, semi-detached, and townhouse residences.

**HOOKER ENGINEERING LTD.**

12 - 2307 14th Street
Regina, Saskatchewan
(306) 525-9815.

Hooker Engineering are involved in the design and construction of solar, heating air and water heating systems.

Projects include:

1. Agro Plex.
2. Armory building.
3. Service Centre for Saskatchewan Telephone.
4. 20 solar-heated homes.
5. Manufacturing plants.
6. Repair depots for highways.
7. SEDCO Research Centre in Saskatoon.
8. SGI Tower in Regina.
9. Retrofit Valleyview Hospital.
10. 6 energy conservation homes.

## CONSULTING AND ENGINEERING FIRMS (continued)

**IBI GROUP**

156 Front Street West, 6th Floor
Toronto, Ontario. M5J 2L6
(416) 596-1930.

Contact: Harold J. Katzin

The firm is engaged in the following projects in the area of solar design:

1. Passive Solar House Design as part of a demonstration project funded by HUDAC and the Ontario Ministry of Energy.
2. Solar Techniques and the Canadian Greenhouse for Agriculture Canada
3. Passive Solar Design Guidelines for office buildings.

Refer also to sections 1.0, 2.2, 5.0, 8.4, 11.0, 14.1, 14.3, and 14.4.

**MARSHALL MACKLIN MONAGHAN LIMITED**

275 Duncan Mill Road
Don Mills, Ontario. M3B 2Y1
(416) 449-2500

Contact: D.W. Beasley

Refer to section 14.1 for a detailed description of the firm's services and projects.

**NOVAMETRIC ENGINEERING**

PO Box 8163, 222 Cardinal Cres.
Saskatoon, Sask. S7K 6C4
(306) 373-4965

Contact: Allan Bens

Refer to section 16.0 for a detailed description of the firm's services and projects.

**Q.D.M. HOLDINGS LTD.**

306-10328-81 Ave.
Edmonton, Alberta. T6E 1X2
(403) 432-9175

The firm is primarily in the business of designing passive solar and well insulated units specifically for low rise residential structures.

Projects include:

1. 3 single family dwellings.

CONSULTING AND ENGINEERING FIRMS (continued)

**BARRY ROBEY DESIGN UNIT**

200, 121 - 15th Avenue
Calgary, Alberta. T2G 1G1
(403) 265-1950

The firm is involved in the design, consulting and teaching aspects of energy conservation planning.

Projects include:

1. A large 5,000 sq.ft. house.
2. One active solar assisted house.
3. Two houses partially earth-bermed.
4. Instructed a course on "Designing and Building Your Own House." for the Calgary School Board.

**SASKMONT ENGINEERING COMPANY LTD.**

Contact: Brian George

500 - 2400 College
Regina, Saskatchewan
(306) 525-8166.

The firm is involved with thermostorage and solar design as well as consulting in the field of energy conservation.

Projects include:

1. R.C.M.P. building offices
2. University building offices
3. Telephone exchange office structure.

**SUN WOODS ENGINEERING LTD.**

Contact: Jim Bassett

P.O. Box 100
Christopher Lake, Sask. S0J 0N0
(306) 982-4315

The firm designs air recovery systems and active/passive solar houses. The firm also consults, monitors buildings and provides some general contracting.

Projects have included 5 air recovery systems for Sun Center Systems in Prince Albert.

## CONSULTING AND ENGINEERING FIRMS (United States)

**JOSEPH A. BULLEN, JR.**
Contact: Joseph Bullen

3504 North Ridge Drive
Pueblo, Colorado. U.S.A. 81008
(303) 544-8281

Mr. Bullen is a consulting engineer involved in residential solar design. Projects include:

1. Single-storey home with a solar water collector system
2. Several other residences with solar-air collector systems.

**DUBIN-MINDELL-BLOOME ASSOCIATES**
Contact: Fred Dubin

42 West 39th Street
New York, N.Y. U.S.A. 10018
(212) 868-9700

The firm has been involved in the engineering aspects of projects concerned with solar energy and energy conserving techniques. Projects have included residential, commercial, and institutional structures located throughout the United States and internationally.

**ENVIRONMENTAL CONSULTING SERVICE**
Contact: Dr. Jan Kreider

Walnut Street
Boulder, Colorado. U.S.A. 80203
(303) 443-1235

Dr. Kreider has acted as consulting engineer on several projects including a residential structure designed in the form of a hemispherical geodesic dome space and a solar house that utilizes a spherical stationary relective concentrator.

**SMITH, HINCHMAN AND GRYLLS ASSOCIATES INC.**

455 West Fort Street
Detroit, Michigan. U.S.A. 48226
(313) 964-3000

The firm has been involved in the design of a 1-storey, split-level office building using energy conserving design and planning with the environment. The project was funded under the United States Federal Government Services Administration/Public Building Service as an environmental demonstration project.

## CONSULTING AND ENGINEERING FIRMS (United States continued)

**TOTAL ENVIRONMENTAL ACTION**

Box 47
Harrisville, NH. U.S.A.
(603) 827-3087

Contact: Bruce Anderson

The firm has been involved in the design of several solar dwellings located in the Northeastern United States.

Projects include:

1. Solar homes that utilize solar energy for space heating, and domestic hot water heating.
2. Earth shelter techniques have been used to reduce possible heat loss during winter months and to cool the buildings in the summer.

The firm has also acted as energy conservation and engineering consultants on various solar energy projects.

**URBANA ENERGY**

108 Jackson Street
Trenton, New Jersey. U.S.A.
(609) 695-7774.

The firm is involved in solar siting and design for residential subdivisions.

Currently involved in the passive solar design of a house in Gloucester Township, Camden County, New Jersey. Other firms involved in the project were Princeton Energy Group and Diamond Crest Inc.

## CONSULTING AND ENGINEERING FIRMS (Foreign)

**ENERGY CONSCIOUS DESIGN**

44 Earlham Street, Covent Garden
London, ENGLAND. WC2 9LA
(01) 240-0566

Contact: David Turrent

The firm offers architectural and energy consulting services. One recent project (1980) is the Giffard Park Site II which will provide accommodation for 92 single people in shared flats. The site is located in Milton Keynes and will consist of 4 2-storey terraces. The design maximises use of passive solar gains for space heating and will incorporate high levels of thermal insulation, eight thermo-syphon solar water heating systems and a low consumption air heating system.

## MANUFACTURING FIRMS

**SUN RAY SOLAR SYSTEMS LTD.**

2429 Seminole Street
Windsor, Ontario. N8Y 1X2.
(519) 253-1182.

The firm supplies design and application assistance as needed to those persons and agencies who use Sun Ray Solar System products.

Presently concluding a research and development project on the design of a stainless steel Solar Absorber. Project was contracted by the National Research Council of Canada. Phase II of the project will be a proposal to build and assess a Prototype Absorber.

Company also listed under category 2.3.

**THERMAX CANADA LTD.**

Contact: Ernest Higginson

39 Main Street
Vankleek Hill, Ontario. K0B 1R0
(613) 678-3322

Thermax is a supplier of products for renewable energy systems such as solar, wind, pedal power and water.

Products include:

1. The Thermax TC25PM (and TC25PMB) Power Monitor, which measures voltage and current simultaneously in any DC System. It lets the user measure how much power he is getting or using.
2. The TC60M 12-volt reversible DC motor, ideal for pumps, fans, and solar orienting devices.

MANUFACTURING FIRMS (United States)

SCIENTIFIC SOLAR CORPORATION

Contact: Spencer Dickinson

Route 1, Box 205
Jamestown, R.I. U.S.A. 02835
(401) 423-1025

Refer to section 12.0 for a detailed description of the firm's services and projects.

## DEVELOPMENT AND CONSTRUCTION COMPANIES

**ALTERNATE ENERGY HOMES LTD.**
4301 - 51st Avenue, P.O. Box 538
Beaumont, Alberta. T0C 0H0
Contact: Ed Moline
(403) 929-9176

The firm designs homes insulated with passive energy collection systems. Examples of projects include 3 energy sufficient homes (1 with added greenhouse) and a passive solar home.

**CAIRN HOMES LTD.**
1249 - 8th Street East
Saskatoon, Sask. S7H 0S5
Contact: Grant Robertson
(306) 477-2700

The firm provides project management and general contracting services along with solar insulation standards and wall systems design.

Projects include:

1. 13 HUDAC Builders Homes
2. 6 houses under the Federal Government Home Energy Loan Program.

**HOUSESCAPES**
8411 - 139 Avenue
Edmonton, Alberta. T5E 2B4
Contact: Brian Sorlie
(403) 475-5267

The firm designs passive solar residential systems. Projects include 5 single family dwelling per year in the past 5 years.

**SOLTERRA DEVELOPMENTS LTD.**
1355 Wellington Street
Ottawa, Ontario. K1Y 3C2.
Contact: Michael Lambert
(613) 729-3116

The firm specializes in super-insulated, air-tight house construction and attached solar-heated greenhouse/sunrooms.

Projects include:

1. Four double-stud wall frame houses.
2. Approximately 30 greenhouses - designed and constructed.
3. "Joy" Residence in Nepean and "The Bower" Residence in Osgoode. Both houses were monitored by Scanada Consultants for the Solar Energy Program of the NRC.

## DEVELOPMENT AND CONSTRUCTION COMPANIES (United States)

SUNSAV INC.- TOTAL ENERGY SYSTEMS
640 South Union Street
Lawrence, Mass. U.S.A. 01843
Contact: Richard J. Broderick
(617) 687-0044

The firm's area of specialization involves the design and installation of active solar space heating and/or domestic hot water heating using straight solar collector energy or solar-assisted heat pumps. Projects have included:

1. A Public Housing Project for the elderly involving a cluster of six buildings.
2. 2 Nursing Homes
3. An office and a government building.

# SECTION 2.2

# CONSTRUCTION

## GOVERNMENT (FEDERAL)

**NATIONAL RESEARCH COUNCIL OF CANADA**

Contact: Dr. T. LeFeuvre

Solar Energy Program
Building 92, Montreal Rd.
Ottawa, Ontario. K1A 0R6
(613) 993-9224

The following is a list of projects conducted by Dr. LeFeuvre under the Solar Energy Program.

1. Design and Installation of a Solar Hot-Water Heating System on a Motor Lodge. A retrofit solar hot-water system to provide a portion of the heat required for service water in the hotel units and kitchen facilities and to provide seasonal heating for the outdoor swimming pool was designed and installed on Cabana Lodge, on Lake Memphremagog, Magog, Quebec for a cost of $68,000 in 1981.

2. Installation of a solar process water heating system for a laundry. The retrofit was designed to provide process water preheating for Workwear Limited, 17 Benton Road, Toronto, Ontario. Contact: Frank Koletar at (416) 751-4100.

3. Installation of a solar heating system for a bottle-washing operation at Mountain Spring Beverages Ltd., 10135 - 50th Street, Edmonton, Alta. T6A 2C1. Contact: D. Denome at (403) 465-0591.

4. Installation of a solar Process-Hot-Water heating system at Provost Cartage Inc., 7887 rue Grenache, Ville d'Anjou, Quebec. H1J 1C4. Contact: Mr. M. Provost at (514) 353-0550.

5. Solar Hot Water System for the Globe & Mail Newspaper Building at 444 Front Street, Toronto, Ontario. M5V 2S9. The system, installed with funding by the NRC, is a trial effort to supply hot water for washrooms and process hot water for printing-plate washing. Contact: F. Robinson (416) 598-5444.

For further information on any of the projects, contact Dr. LeFeuvre at (613) 993-9224.

## RESEARCH INSTITUTIONS

CONFEDERATION COLLEGE    Thunder Bay, Ontario

The College is presently installing a solar hot water heater in a residence in Thunder Bay. Energy Audits and testing will be carried out by a team from the school.

INSTITUTE OF MAN AND RESOURCES    49 Dorval Street
Charlottetown, P.E.I.
Contact: Mr. Dave Murray    (902) 892-0361

The institute's orientation is one of research, development and demonstration. The following is an example of the type of demonstration project in which the institute is involved.

1. Conservation, Renewable Energy, and Solar DHW Heating

   To accelerate solar DHW systems commercial infrastructure, 85 systems are to be installed to demonstrate the technology, determine installation costs, cost effectiveness, identify opportunities and institutional barriers inhibiting further growth of solar commercialization. Funded by EMR, Canada @ $230,000.00, the project is ongoing from 1981-1986, throughout P.E.I.

## MANUFACTURING FIRMS

PRODUITS GAZA PRODUCT INC.

2280 Rue Florian, Suite 700
Montreal, Quebec. H2K 2P5
(514) 522-2195

Contact: G. Gazaille

The firm is engaged in investigating the application of solar heating to process water heating in the food canning industry. The Gaza plant has a year round demand for process hot water. The project was funded by the NRC under the Solar Energy Program.

SLEETH REFRIGERATION, HEATING AND AIR CONDITIONING LTD.

1085 Princess Street
Kingston, Ontario. K7L 1H3
(613) 549-4040

Contact: D. Sleeth

Design and installation of a solar service hot water system at a restaurant to supply a year round demand of hot water. The project was completed under contract to the NRC's Solar Energy Program in 1982 for a cost of $49,997.

## MANUFACTURING FIRMS (United States)

SCIENTIFIC SOLAR CORPORATION

Contact: Spencer Dickinson

Route 1, Box 205
Jamestown, R.I. U.S.A. 02835
(401) 423-1025

Refer to section 2.3 for a detailed description of the firm's services and projects.

## DEVELOPMENT AND CONSTRUCTION COMPANIES

**ANZAC CITIZEN ASSOCIATION and**
**SUNERGY SYSTEMS LTD.** Anzac, Alberta

With funding from the Alberta/Canada Energy Resources Research Fund, a joint program of the Alberta Department of Energy and Natural Resources, and EMR Canada, the Citizens' Association was able to design, construct and monitor a community centre is Anzac, northern Alberta. The centre employs basic passive solar techniques emphasizing energy-efficient features and use of local materials. The design and construction of an energy-efficient, yet low cost public building for Anzac will help diffuse such technology in northern communities.

**PARABOLIC SOLAR CONSTRUCTION**

111 Isabella Street East
Saskatoon, Sask. S7J 0B1
(306) 382-9293

Contact: Swan Gemmel

The firm provides general contracting services. An example of the types of projects the firm conducts is the construction of one house with a double wall.

**SUNHOUSE HOMES LIMITED**

5-1945 Scarth Street
Regina, Saskatchewan. S4P 2H2
(306) 352-4433

Contact: Henry Lorenzen

The firm provides research services on projects in addition to the general contracting services. Projects have included a medical clinic and 4 solar energized farm homes.

## CONSULTING AND ENGINEERING FIRMS

IBI GROUP
156 Front Street West, 6th Fl.
Toronto, Ontario. M5J 2L6.
Contact: Harold J. Katzin
(416) 596-1930

Projects in the area of solar construction include the preparation of the construction report for the Passive Solar Demonstration Project for HUDAC and the Ontario Ministry of Energy.

Refer also to sections 1.0, 2.1, 5.0, 8.4, 11.0, 14.1, 14.3, and 14.4.

SOLAR SYSTEMS INDUSTRIES LTD.
#2 - 11771 Horseshoe Way
Richmond, B.C. V7A 4S5
Contact: E.W. Hoffman
(604) 271-2621

The company designed and installed a solar service hot water heating system in a 42-unit apartment building in White Rock, B.C. The project was funded by the NRC for $70,675, under the Federal Solar Energy Program.

SUN SHELTERS LTD.
334 King Street East, #206
Toronto, Ontario
Contact: Brian Marshall
(416) 363-9431

This company designs and constructs solar greenhouses as well as retrofitting the exterior frame of existing buildings. Work has been located to-date in Southern Ontario and is privately financed and operated.

# SECTION 2.3

# COMPONENTS

## GOVERNMENT (PROVINCIAL)

ONTARIO MINISTRY OF NATURAL RESOURCES

Kakabeka Falls Provincial Park
Thunder Bay, Ontario.

The Kakabeka Falls Provincial Park has installed solar hot water heating systems at the park's comfort stations. These heating systems are being monitored and tested by the Ministry.

## GOVERNMENT (MUNICIPAL)

CITY OF NEPEAN

Contact: Noel Brown

1701 Woodroffe Avenue
Nepean, Ontario. N2G 1W2
(613) 224-8090

The City is involved in the design and installation of a solar heating system for process hot water for the Barrhaven Recreational complex. The project is funded by the NRC's Solar Energy Program. The project is being co-ordinated by Noel Brown of Clemman, Large, Patterson and Associates Ltd.

## RESEARCH INSTITUTIONS

CANADIAN ENERGY DEVELOPMENT SYSTEMS INTERNATIONAL

P.O. Box 8004
Billings Bridge Plaza
Ottawa, Ontario K1A 3H6
(613) 749-7811

Contact: D.A. Henry

Under the NRC's Solar Energy Program, funding was provided to develop and test a small photovoltaic-powered, positive displacement pumping system. Primarily for use in irrigation, the system will use a maximum-power-point tracker to maximize the useful power from the photovoltaic panels. This will be used to drive an Agricola pump (developed by Polyenergie Inc. of Canada).

CENTRE DE RECHERCHE INDUSTRIELLE DU QUEBEC

333 rue Franquet
Sainte-Foy, Quebec. G1V 4C7
(418) 659-1550

Contact: Y. Cote

Under a grant from the NRC and in association with the Institut national de la recherche scientifique - Energie, a developmental test facility for solar equipment was designed. This facility is intended to serve the province of Quebec and surrounding areas.

INSTITUT NATIONAL DE LA RECHERCHE SCIENTIFIQUE

1650 Montee Sainte Julie
C.P. 1020
Varennes, Quebec. J0L 2P0
(514) 652-9836

Contact: Fernand Rheault

The NRC funded the establishment of a thermal development testing facility for solar equipment at the INRS.

LAKEHEAD UNIVERSITY

Thunder Bay, Ontario.

Contact: P.K.C. Yang

The university is currently engaged in research on a solar-powered kiln for drying lumber.

## RESEARCH INSTITUTIONS (United States)

**UNIVERSITY OF ALASKA**

Contact: Keith B. Mather

901 Koyukuk Avenue South
Room 10, Arctic Health Building
Fairbanks, Alaska.
U.S.A. 99701

The university conducted a wide range of energy-related projects of great potential benefit to Alaska including studies of energy storage. Extreme seasonal variation in both energy sources imposed the need for long-term storage of energy. Substantial advances were made in the fields of storing solar heat in the ground for residential heating use and utilization of Alaska's natural zeolites for energy storage.

## PROFESSIONAL ASSOCIATIONS

CANADIAN STANDARDS ASSOCN.
178 Rexdale Blvd.
Toronto, Ontario. M9W 1R3
Contact: C. Johnson
(416) 744-4086

Under a grant from the NRC's Solar Energy Program, the CSA was commissioned to prepare a draft standard for solar collectors. This would allow a testing program to be carried out to establish the validity, feasibility, and practicality of the standards.

## MANUFACTURING FIRMS

AMHERST RENEWABLES ENERGIES LTD.
P.O. Box 387
Perth, Ontario. K0H 3G7
Contact: Richard Davies
(613) 267-6060

The firm produces liquid flat plate collectors, air flat plate collectors, evacuated tube modules, closed loop DHW systems, monitoring systems and liquid heat exchangers.

ASECOR
Rideau Valley Drive, Box 929
Manotick, Ontario. K0A 2N0
Contact: Dr. E.G. Plett
(613) 692-4264

The company, under a grant from the NRC's Solar Energy Program, developed a prototype cylindrical parabolic solar collector for Canadian conditions and tested it's performance.

CONSERVAL ENGINEERING, INC.
224 Bridge Street
Carleton Place, Ontario. K7C 3P5
Contact: Robert Karzwell
(613) 257-7620

The company makes differential solar controllers, monitoring equipment and air-handling controllers.

DYNAMIC MINING EXPLORATION LTD.
870 Calgary Pl., 355-4th Ave.S.W.
Calgary, Alberta T2P 0J1
Contact: Prof. Tang G. Lee
(403) 284-6608

The company developed and produces the Lee Dynamic Solar Collector, which is an air tight flat plate solar heating system currently being monitored in the Calgary Chinese Church.

The collector will be suitable for low, medium and high rise residential structures and retail and light industrial structures.

MANUFACTURING FIRMS (continued)

FIBRATECH INC.
5344 - 13th Avenue
Montreal, Quebec. K1X 2X8
Contact: Pierre Boisvert
(514) 727-5955

The firm's product inventory includes the following:

1. Liquid flat plate collectors
2. Freon collectors
3. Heat exchangers
4. Storage tanks
5. Differential controllers
6. Monitoring systems

FUTURE RESOURCES AND ENERGY LTD.
P.O. Box 1358, Station B
Downsview, Ontario. M3H 5W3
Contact: Fred Drucker
(416) 630-8343

Presently, the company is involved in designing and constructing solar collectors that use heat pipes. This development is in conjunction with Mr. A. Neuman of Energy Wise, 247 Armstrong, unit 11, Georgetown, Ontario. (416) 453-1991

HUNT ROBERT CORP.
501 - 45 Street E.
Saskatoon, Saskatchewan
Contact: Kurt Haugred
(306) 244-2800

The company manufactures Sun Rooms, oriented for use in low rise residential units and restaurants. Skylights form the roof portion with the sides made of tempered glass. Casement windows and a patio door are totally maintenance free.

NORTEC SOLAR INDUSTRIES LTD.
P.O. Box 288, Century Road
Manotick, Ontario. K0A 2N0
Contact: James Ramsden
(613) 692-2513

The firm is involved in the manufacture of the following solar products:

1. TD1000 Thermal Diode Solar Collectors
2. Liquid Flat Plate Collectors
3. Closed Loop Solar Hot Water System
4. Drain Back Solar Hot Water System.

MANUFACTURING FIRMS (continued)

OTTAWA SOLARTRONICS LTD.
P.O. Box 13220
Kanata, Ontario. K2K 1X4
Contact: Rick Shorkey
(613) 820-3274

Glazed plastic collectors and thermosyphon DHW systems are manufactured by this company.

PAGET ELECTRONICS LTD.
71 Industrial Avenue
Carleton Place, Ontario. K7C 3V7
Contact: J. Alec Rait
(613) 257-7620

The firm manufactures solar controllers and monitoring equipment for use by industries. The types of products include temperature monitors, greenhouse controllers, commercial solar collectors, solar air controllers, etc.

PETRO-SUN INC.
2915 Boulevard Pitfield
Ville St. Laurent, Quebec. M4S 1L6
Contact: Jacques Sicotte
(514) 337-2264

The firm's product inventory includes the following:

1. Liquid flat plate collectors
2. Unglazed pool collectors
3. Tracking evacuated tube concentrating collectors
4. Drain-back DHW systems
5. Closed-loop DHW systems
6. Recirculating DHW systems
7. Thermosyphon DHW systems
8. Pool heating systems
9. Solar desalination plants
10. Solar irrigation plants
11. Solar cooling equipment
12. Differential controls
13. Plate tracking photovoltaic collectors.

SASKATCHEWAN MINERALS
P.O. Box 120
Chaplin, Sask. S0H 0V0.
(306) 395-2561.

The firm is involved in the production of energy storage trays.

## MANUFACTURING FIRMS (continued)

**SILONEX INC.**

Contact: Dr. M. Pawlowski

2150 Ward Street
Montreal, Quebec. H4M 1T7
(514) 744-5507

The company produces photovoltaic cells and panels.

The development of an encapsulated silicon solar cell module was funded under the NRC's Solar Energy Program for a cost of $168,816. Fabrication of surface junction solar cells by the University of British Columbia (D.L. Pulfrey, investigator) was followed by encapsulation at Silonex.

**SOLAR CELLS LTD.**

Contact: Don Adkinson

P.O. Box 1025
Burlington, Ontario. L7P 3S9
(416) 335-4713

The firm manufactures air collectors and photovoltaic modules and power systems.

The firm is involved in the following projects:

1. The NRC funded a project to develop solar cells that use recrystallization powder technology. (Pressed powder substrates of quaternary or pentenary alloys).
2. The NRC funded another project to investigate two methods of depositing conducting oxides on semiconductor-insulator-semiconductor (SIS) photovoltaic cells, and to produce them on 3x3 polycrystalline silicon substrates.
3. NRC-funded development of a modular photovoltaic power system.

**SOLARPLAST LTD.**

Contact: William C. Smith

1045 Hargrieve Road
London, Ontario. N6E 1P6
(519) 685-1480

The firm manufactures unglazed plastic pool collectors.

## MANUFACTURING FIRMS (continued)

SOLAR SYSTEMS INDUSTRIES LTD.
11771 Horseshoe Way, Unit #2
Richmond, B.C. V7A 4S5
Contact: Erich Hoffmann
(604) 271-2621

Refer to Section 2.2 for a description of the firm's services and projects.

SOLARTECH LIMITED
39 Cranfield Road
Toronto, Ontario. M4B 3H6
Contact: David Mandelstam
(416) 752-4990

The firm was involved in the development of a bread-box water heater for seasonal use. The project was funded by the NRC under the Solar Energy Program. The bread-box solar hot-water heater was designed for summer use in residences and will be exported to other countries. After preparing a detailed design and working drawings, a prototype unit was constructed and tested to determine its thermal performance and reliability.

Product inventory includes:

1. Evacuated tube modules
2. Liquid flat plate collectors
3. Air collectors
4. Drain-back DHW systems.

SOLAR TEMP SYSTEMS LTD.
1110 Brydges Street
London, Ontario. N5W 2B6
Contact: Brian Maguire
(519) 451-2962

The firm manufactures liquid flate plate collectors.

SOLATHERM INC.
1200 Aerowood Drive, Unit #40
Mississauga, Ontario. L4W 2S7
Contact: Dennis Banning
(416) 624-3700

The firm manufactures liquid flat plate collectors, closed-loop DHW systems and drain-back DHW systems.

## MANUFACTURING FIRMS (continued)

SOLCAN LTD.
R.R. # 3
London, Ontario. N6A 4B7
Contact: R.K. Swartman
(519) 473-0501.

The firm designs, manufactures and installs solar DHW and heating systems.

Funded by the National Research Council of Canada under the Solar Energy Program, the firm developed a thermosyphon heat exchanger. The objective of the work was to determine whether a thermosyphon heat exchanger could be used in a solar domestic hot-water system to transfer heat from the pumped collector loop to storage.

Product inventory includes: Liquid flat plate collectors, thermosyphon DHW systems, closed-loop DHW systems and three types of greenhouses; lean-to, free-standing and vertical.

SOLESTIAL SOLAR PANELS INC.
44 Bartlett Road, P.O. Box 359
Beamsville, Ontario. L0R 1B0
Contact: Louis Morissette
(416) 563-8203

The firm manufactures liquid flat plate collectors.

SOL-WAY SOLAR ENGINEERING LTD.
942 Southwest Marine Dr. Unit #42
Vancouver, B.C. V60 5Z2
Contact: John Richardson
(604) 324-3327

The firm's product inventory includes:

1. Liquid flat plate collectors
2. Drain-back DHW systems
3. Tank-in-tank heat exchangers.

SUNGLO SOLAR LTD.
1081 Alness Street
Downsview, Ontario. M3J 2J1
Contact: Joe Sherman
(416) 661-2560

The firm manufactures unglazed plastic pool collectors and pool control modules.

## MANUFACTURING FIRMS (continued)

SUN CENTRE SYSTEMS
Contact: Barry Hedrick, Mgr.

P.O. Box 2437, 1020 - 1 Avenue N.W.
Prince Albert, Sask. S6V 7G5
(306) 922-2665

Currently producing Solar Air Collectors. These collectors are vertically mounted and are louvered to allow air to flow up through the louvre and pick up the heat.

SUN RAY SOLAR SYSTEMS LTD.
Contact: Rick Metcalfe

2429 Seminole Street
Windsor, Ontario. N8Y 1X2.
(519) 253-1182

The firm manufactures solar energy products as well as supplying design and application assistance.

The firm's product inventory includes liquid flat plate collectors and closed loop DHW systems.

See also listing under 2.1.

T.E.S. LTD
Contact: G. Doherty

P.O. Box 9372
Ottawa, Ontario. K1B 3V1
(613) 741-9402

A battery-charge controller and battery heater for a photovoltaic power supply are to be designed with funds from the NRC's Solar Energy Program. The controller and heater, once developed, will be incorporated into a photovoltaic system and evaluated by comparison with a standard system.

TEMPERATURE SPECIALTIES MANUFACTURERS LTD.
Contact: Tibor Lucas

585 Canarctic Drive
Downsview, Ontario. M3J 2P9
(416) 661-0535

The firm's product inventory includes liquid flat plate collectors and closed-loop DHW systems.

## MANUFACTURING FIRMS (continued)

TPK SOLAR SYSTEMS LTD.
149 Bentley Avenue, Bay 4-A
Nepean, Ontario
Contact: Dr. R.E. Thomas
(613) 225-4403

The firm manufactures photovoltaic cells and panels.

Under the NRC's Solar Energy Program, the company was granted $313,800 to develop technologies for preparing solar cells using low-cost, non-crystalline substrates.

WATERSHED ENERGY SYSTEMS LTD.
108 Liberty Street West
Toronto, Ontario. M6K 3C4
Contact: Doug Hart
(416) 536-6884

This company provides air collectors, liquid flat plate collectors, drain-back DHW systems, space heating systems and convection suppressant window glazings to the solar builder.

WESTERN CONCORD MANUFACTURING
14743 - 134 Avenue
Edmonton, Alberta. T5L 4S9
Contact: Roger Adams, Mgr.
(403) 452-5681

Western Concord manufactures pool covers made of reinforced polyethylene fabric with a foam insulated, laminated surface. Their function is to hold heat in the pool when not in use.

JOHN WOOD LTD.
101 Hanson Street
Toronto, Ontario. M4C 1A2
Contact: George McNeill
(416) 698-9100

The firm manufactures glass-lined storage tanks.

## MANUFACTURING FIRMS (United States)

**FREE ENERGY SYSTEMS INC.**

Rockdale Industrial Park
Mount and Red Hill Roads
Lenni, Pennsylvania. U.S.A. 19052
(215) 583-4780

The company is involved in the manufacture of silicon photovoltaic cells for industrial, commercial and recreational needs. The products have been used as a marine battery charger, for water pumps, lighting and in telecommunications.

The product inventory is as follows:

1. Model 129SL 18 Volts o/c, 600mla, 10 watts.
2. Model 1233SL 18 Volts o/c. 2.2 amps., 33 watts.
3. Model 129SQ 18 Volts o/c, 600mla, 10 watts.

**GENERAL ELECTRIC CO.**
Advanced Energy Department

P.O. Box 13601
Philadelphia, PA. U.S.A. 19101
(215) 962-2112

The firm manufactures Solartron TM., a high efficiency, vacuum tube solar collectors that are ideally suited for commercial and industrial uses. They are now in use at Enders Pediatric Hospital (Boston, MA.), the Museum of Science and Industry (Chicago, IL.), and the First National Bank (Richland, WA.).

Models: TC 100 and the larger panel TC 120.

**INSOLAR INC.**

212 E. Main Street,
Port Jervis, New York.
U.S.A. 12771

Presently engaged in the manufacture of a thermal storage system based on a chemical compound that absorbs and releases heat as it freezes and thaws.

Products include:

1. Thermostor - phase change stabilizer
2. Solartube - Solar tubes used in roofs and/or walls.

**MANUFACTURING FIRMS** (United States continued)

H.A. SCHLATTER INC.
4640 Colt Road
Rockford, Illinois. U.S.A. 61109

The firm is a manufacturer of solar absorbers. For more information on the range of solar absorber plates, please contact the firm directly.

SCIENTIFIC SOLAR CORPORATION
Route 1, Box 205
Jamestown, RI U.S.A. 02835
Contact: Spencer Dickinson
(401) 423-1025

The company designs and sells complete component packages for active residential solar heating systems as well as consulting in house design and construction methods.

SHELLEY RADIANT CEILING COMPANY
456 W. Frontage Road
Northfield, Illinois. U.S.A. 60093.
(312) 446-2800.

Manufacturers of heating and cooling panels which are installed at the perimeter of buildings.
All research and testing is performed outside the company.

SOLAR COMPONENTS CORPORATION
121 Valley Street P.O. Box 237
Manchester, NH U.S.A. 03105
(603) 668-8186

The company's solar Mail Order Catalogue lists numerous products for purchase. Products include:

1. Sun-Lite Premium II - fibreglass-reinforced polymer (FRP) sheeting
2. Sun-Lite insulated glazing panels
3. Sunwall - Kalwall Solar Glazing Panel System
4. Kalwall Solar Attic System
5. Sun-Lite translucent insulated skylights
6. Sun-Lite water storage tubes
7. Sun-Lite Solar Pod - phase change thermal storage system that transmits light and releases heat.
8. Solar-Kal Air Heaters
9. Sun-Lite Window Air Heaters
10. Sun-Lite Solar Greenhouse/Collectors

MANUFACTURING FIRMS (United States continued)

SOLAR ENERGY CORPORATION - SOLEC
553 Pretty Brook Road
Princeton, NJ U.S.A. 08540

Contact: R. Aresty

Product inventory:

1. SOLKOTE Hi-Sorb I - an optical coating specifically formulated for solar energy applications. It has a high temperature tolerance, is resistant to moisture and UV degradation and its excellent optical qualities make it an ideal, low cost substitute for electro or vacuum deposited selective surfaces.
2. SOLCOST - a simplified computer model that compares life cycle costs of a solar system versus a reference (conventional) hot water system. This Solar Hot Water design method is for use on residential and light commercial solar hot water systems. Three types of analysis are coupled together to evaluate active solar collection systems; a hot water load analysis, a life cycle cost analysis and a solar collector/system performance analysis to yield comparative paybacks, detailed cash flows and the correct storage size and tilt angle.

SOLAR INDUSTRIES INTERNATIONAL
Hwy. 34
Manasquan, NJ U.S.A. 08736.
(201) 223-8100.

The firm develops and manufactures liquid solar heat collectors (flat plate). The product is distributed world-wide, mainly for swimming pool and domestic hot water heating.

SOLENERGY CORPORATION
171 Merrimac Street
Woburn, Mass. U.S.A. 01801.
(617) 938-0563.

Manufacturer of solar photovoltaic cells, modules, and generators for remote electrical power.
Products are shipped throughout the world for communications, signals, lighting, test instrumentation, and horse power.

MANUFACTURING FIRMS (United States continued)

**TERRA-LIGHT INC.**

30 Manning Road, P.O. Box 493
Billerica, Mass. U.S.A. 01821
(617) 663-2075.

Manufacturer of flat plate solar absorber panels for swimming pools and space or domestic water heating applications.

**THERMATOOL CORP.**

Contact: Robert Russell

280 Fairfield Avenue
Stamford, Connecticut 06902
(203) 357-1555

The company manufactures THERMAFIN Solar Energy Absorber Plates and fintubes which are generally supplied to collector manufacturers. Unlike absorber designs which rely upon solder, adhesive or mechanical joints, Thermafin achieves unrestricted transfer of heat between fin and tube. (Other joints must be up to 20 times as wide as the fin to transfer the heat without additional resistance.) The 100% thermal efficiency of the Thermafin joint has been proven through independent lab tests under ASHRAE 93-77 specifications.

## CONSULTING AND ENGINEERING FIRMS

**ATLAS-TURNER**
5600 Hochelaga
Montreal, Quebec. H1N 1W1
Contact: G. Blain
(514) 259-6067

The firm developed a Solar wall collector (SWC) system of pre-fabricated components that are site assembled onto the exterior wall of a building to form an air-cooled solar collector. Fans and ductwork force the heated air into the building. The project was funded by the NRC at a cost of $109,982.

**CAMPBELL-SCANADA ENGINEERING LTD.**
348 Guelph Street
Georgetown, Ontario.
Contact: R. Platts
L7G 4B5.
(416) 457-1404

The firm was involved in the development of four moveable insulating devices for windows. This project was funded by the National Research Council of Canada under the Solar Energy Program. Several types of insulating devices for windows were studied: pliable materials, compressible roll-up and loop roll-up, and translucent panel shutters in three configurations.

**THE ECE GROUP CONSULTING ENGINEERS**
205 Lesmill Road
Don Mills, Ontario. M3B 2V1
Contact: B.S. Szabo
(416) 449-1030

The NRC funded the development and construction of a prototype programmable solar system controller.

**ENERCON INDUSTRIES LTD.**
2073 Cornwall Street
Regina, Saskatchewan. S4P 2K6
Contact: David Lange
(306) 585-0025

The firm was engaged in a research project to develop a thermal shuttering system for windows. The project was funded by the NRC under the Solar Energy Program. Two prototype thermal shutters were developed incorporating a rigid "blanket" of moveable insulation and radiation-reflecting material between the two panes of glass of a specially designed factory build window unit. One shutter was designed for regular window shapes and the other for full length windows.

## CONSULTING AND ENGINEERING FIRMS (continued)

DON LAHEY

R.R. # 2
Plantagenet, Ontario. K0B 1L0
(613) 673-4322

The National Research Council of Canada under the Solar Energy Program sponsored the research to investigate thermally activated control devices for use in passive solar systems.
Shape-memory alloys and inexpensive pneumatic cylinders were studied to determine the feasibility of using them to control window shutters and heating control dampers in passive solar systems.

PHOTOCHEMICAL RESEARCH ASSOCIATES

45 Meg Drive
London, Ontario. N6E 2V2
(519) 679-2950

Contact: A. Fred Jansen

The company is investigating the development of an inexpensive, organic photovoltaic solar cell. The project is being funded under the NRC's Solar Energy Program.

W.L. WARDROP & ASSOCIATES LTD.

77 Main Street
Winnipeg, Manitoba. R3C 3H1
(204) 956-0980

Contact: R. Giercke

Under contract to the NRC's Solar Energy Program, the firm is to commission, upgrade and maintain up to twelve solar systems and to recalibrate and maintain the monitoring subsystems.

## DEVELOPMENT AND CONSTRUCTION FIRMS

HAWES AND WIGHT LTD.

P.O. Box 821
Pointe Claire, Que. H9R 4Z5
1-800-267-9324

Contact: Mr. W. Wight

The firm is involved in the design of a factory-built transportable solarium. The project is being funded by the National Research Council under the Solar Energy Program.

WATERSHED ENERGY SYSTEMS LTD.

97 Six Point Road
Toronto, Ontario. M8Z 2X3
(416) 233-3241

Contact: Douglas Hart

Under NRC's Solar Energy Program, the firm was given funds for the preliminary design and construction of a hybrid sunspace module for retrofit applications (Phase I).

# SECTION 2.4

# TESTING AND ANALYSIS

GOVERNMENT (FEDERAL)

NATIONAL RESEARCH COUNCIL OF CANADA

Div. of Energy Research & Dev.
Montreal Road
Ottawa, Ontario. K1A 0R6
(613) 993-2730

The NRC laboratories are investigating topics on solar energy ranging from the quality and quantity of sunshine to how it can be stored or converted into electricity.

Project Inventory:

1. Solar R & D and Systems Trials. The study, undertaken by Hickling-Partners Inc., (Suite 605, 350 Sparks Street, Ottawa, Ontario. K1R 7S8), identified suitable types of large scale industrial and residential applications for solar water heating systems.

PUBLIC WORKS CANADA

Sir Charles Tupper Building
Confederation Heights
Ottawa, Ontario. K1A 0M2
(613) 994-3475

The department is involved in several solar energy programs. The aim of the programs are:

1. To establish a solar heating industry in Canada
2. To prevent depletion of non-renewable energy sources
3. To acquire operating experience for consumer benefit
4. To conserve oil supplies and reduce federal energy costs.

The programs are as follows:

1. Purchase and Use of Solar Heating (PUSH) is a program to install solar heating on federally-owned buildings
2. Program of Assistance to Solar Equipment Manufacturers is an arrangement of shared cost contracts with ten Canadian solar equipment firms to help develop, produce and market solar systems
3. Low Energy Building Design Awards (LEBDA) is a national competition for Canadian architects and engineers, which culminated in the publication of a book entitled Winning Low Energy Building Designs and a brochure to promote low-energy design of commercial buildings.

## GOVERNMENT (PROVINCIAL/STATE)

| | |
|---|---|
| STATE OF ALASKA DIVISION<br>OF ENERGY AND POWER DEVELOPMENT | 338 Denali<br>7th Floor, MacKay Building<br>Anchorage, Alaska |
| Contact: Mr. Steve Baden<br>Public Info. Officer | U.S.A. 99501<br>(907) 276-0508 |

The primary concern of the Division of Energy and Power Development of Alaska, is the development, management and efficient use of Alaska's energy resources and the conservation of energy. The Division is part of the Department of Commerce and Economic Development.

Project Inventory:

1. Fairbanks Solar Panel Test.
   The Fairbanks North Star Borough will design, install and monitor four different types of solar collectors. The solar panels will be used to heat the Fairbanks May Siah Recreation Center.

GOVERNMENT (MUNICIPAL)

LINCOLN COUNTY BOARD OF EDUCATION
112 Oakdale Avenue
St. Catharines, Ont. L2P 3J9
Contact: Doug Grayson
(416) 685-1551

The Applewood Public School in St. Catharines is the first solar heated school in Canada (built in 1978). The school was designed to conserve energy and is being monitored by the National Research Council of Canada. The project was constructed to demonstrate to school boards across Ontario the potential application of energy conserving techniques in school buildings incorporating solar heating and providing a solar energy teaching aid for staff, students and visitors. The project was funded by the Ontario Ministries of Education and Energy, and the National Research Council of Canada.

## RESEARCH INSTITUTIONS

### UNIVERSITY OF ALBERTA

Department of Mechanical Eng.
Edmonton, Alberta. T6G 2H8

The university is involved in the following research projects:

1. An Atlas of Solar Energy for Alberta (Dr. L.C. Nkemdirim)
2. Study of Air-Mediated Solar Heating Systems with Long Range Storage. (Dr. A.M. Robinson).
3. Facility for study of Energy Conservation and Solar Heating in Houses. (Dr. R.R. Gilpin).
4. Application of Boiling and Condensation Heat Transfer to Flat Plate Solar Collectors in Cold Regions. (Dr. K.C. Cheng).

The University is also involved in other areas of research. Refer to sections 4.4, 6.0, and 17.0.

### UNIVERSITY OF BRITISH COLUMBIA

Contact: Prof. R.A. Nodwell

Department of Physics
2075 Westbrook Mall
Vancouver, B.C. V6T 1W5
(604) 228-3853

A study funded by the NRC's Solar Energy Program, will identify the most practical design of a solar lighting system incorporating light-pipe technology for use in multi-storey buildings in Canada.

### B.C. RESEARCH

Contact: Mehrzad Movassaghi

3650 Wesbrook Mall
Vancouver, B.C. V6S 2L2
(604) 224-4331

A testing facility for solar equipment is to be designed, built, and commissioned through funds from the NRC's Solar Energy Program.

RESEARCH INSTITUTIONS continued

UNIVERSITY OF CALGARY

Department of Mechanical Eng.
Calgary, Alberta.

Contact: Dr. L.C. Nkemdirim

The following projects were funded under the Alberta Universities Program of the Alberta/Canada Energy Resources Research Fund, a joint program of Alberta Dept. of Energy and Natural Resources and EMR, Canada.

1. An atlas of Solar Energy for Alberta. (Dr. L.C. Nkemdirim).
2. Control of Energy Losses Caused by Microbial Fouling of Heat Exchangers in Thermal Energy Recovery Operations. (Dr. J.W. Costerton).

Refer also to section 4.4 and 14.4 for more information on the University's research endeavours.

CARLETON UNIVERSITY

Colonel By Drive
Ottawa, Ontario. K1S 5B6
(613) 231-2760

Contact: C.H. Langford

The NRC's Solar Energy Program funded the university to investigate energy storage and fuel formation using zeolites. (Naturally occurring or synthetic aluminosilicate crystalline materials). Several structures for storing energy were investigated, namely, fluidized beds, fixed beds, and a zeolite heat pump. A radial storage bed and a seven-bed storage module were constructed and tested.

McGILL UNIVERSITY

Dept. of Mechanical Eng.
817 Sherbrooke Street West
Montreal, Quebec. N3A 2K6

Contact: Dr. Charles Murphy

Presently the Department is working on improving the efficiency of the Solar Tower for Central Heating in Canada using a theoretical computer program, DELSOL.

UNIVERSITY OF TORONTO

Innovations Foundation
Toronto, Ontario. M5T 1P9
(416) 978-5117

Contact: Mr. E.H. Young

Under the NRC's Solar Energy Program, funds were provided to study amorphous silicon photovoltaic solar cells.

**RESEARCH INSTITUTIONS** continued

UNIVERSITY OF WATERLOO

Waterloo Research Institute
Waterloo, Ontario. N2L 3G1
(519) 885-1211

Contact: Dr. M. Chandrashekar

The Institute received funds from the National Research Council of Canada under the Solar Energy Program to conduct several projects on solar energy testing and analysis. These projects are described below:

1. WATSUN III - DHW modification. The project was contracted to develop an advanced version of a WATSUN III-program called DHWA which is an extension of earlier work.
2. Economics of solar domestic hot-water systems. This project developed the software necessary for a micro-computer program designed to give the public a personalized information service on solar DHW systems.

UNIVERSITY OF WINDSOR

Mechanical Engineering Dept.
Building Energy Group
Windsor, Ontario N9B 3P4

Contact: Prof. W.G. Colbourne

Project inventory:

1. Simulation of South-Facing Glass With a Trombe Wall for Passive Solar Heating using Pasole.
   This project involved the modification and extension of the Pasole Computer program to provide a user-oriented input. Use of the Pasole program to analyse various building models to determine the float temperatures, the economics of insulating shutters all with a masonary Trombe wall behind the south-facing glass was also investigated.

2. Monitoring the Energy Use of a Low Energy Passive Solar House.
   A low energy passive solar house has been built near Windsor which incorporates two approaches to energy conservation. The first involves a well-insulated and very tight envelope to reduce heat loss and air infiltration. The second is the use of south-facing window walls with partial Trombe walls to capture solar energy. Two computer simulations will model the house energy use, while an evaluation of things such as temperature swings, optimum window area, effectiveness of Trombe walls and insulating shutters will be completed to evaluate the passive design.

## RESEARCH INSTITUTIONS (United States)

### BRADLEY UNIVERSITY

Contact: Prof. Y.B. Safadi

Dept.of Mechanical Engineering
Peoria, Illinois
U.S.A. 61625
(309) 676-7611

The Department of Mechanical Engineering under Professor Safadi is currently researching heating systems and energy efficiency in design and solar collection.

1. Three dimensional transient analysis of storage medium by the Finite Element method.
2. Solar heating of a fluid at the focal plane of a parabolic collector-transient solution.
3. Thermal stress analysis of transparent material due to high heat flux.
4. Mr. Safadi patented the SAF Solar Air Collector and is the President of SAF Energy Consultants, Inc. - Peoria, Illinois.

For projects in other areas see Sections 8.2 and 14.1.

### UNIVERSITY OF DELAWARE

Contact: Karl W. Boer

College of Engineering
Newark, Delaware.
U.S.A. 19711.
(302) 738-8048

The College of Engineering specializes in the research of photovoltaics and hybrid collector systems. They have installed such systems in 2 houses for testing and analysis.

### UNIVERSITY OF NEBRASKA

Contact: Dr. Bing Chen

Passive Solar Research Group
Univeristy of Nebraska
60th and Dodge, Engr.110
Omaha, Nebraska. U.S.A. 68182

The University's passive solar group is researching the following:

1. Analysis of 12 cold weather test rooms for passive heating. Study of 9 earthtubes for earth contact cooling and research into passive DHW test stands.

## RESEARCH INSTITUTIONS (Foreign)

### BUILDING RESEARCH ESTABLISHMENT

Contact: Dr. D.J. Fisk
Head of Mech. and Elec.
Engineering Division

Department of the Environment
Building Research Station
Garston, Watford
England WD2 7JR
(0927 3) 74040 ext. 7151

The majority of the BRE research programs support the Dept. of the Environment in its policy responsibilities for housing, energy conservation and environmental protection.

Project inventory:

1. Solar Technology. The objectives were to provide an assessment of the implications of the future use of solar collectors and other solar technologies to provide domestic hot water and space heating to buildings, to ensure an adequate technical base upon which standards of performance and installation can be based and to provide guidance to the construction industry, building designers and owners of the performance of solar systems.

2. Solar Energy and Buildings. The objectives of this project were to evaluate the energy that can be saved in the provision of hot water by installing solar "pre-heating" systems in dwellings and to identify problems associated with the installation, operation and maintenance of such systems.

For other projects, refer to sections 3.0, 5.0, 8.4, 10.0, 11.0, and 17.0.

## MANUFACTURING FIRMS

ANDREW ANTENNA CO. LTD.
606 Beech Street
Whitby, Ontario. L1N 5S2
Contact: Mr. W.F. Weir
(416) 668-3348

A design study of receiver systems suitable for a line-focus solar concentrator is to be carried out under funding from the NRC's Solar Energy Program. The study includes the design of a line-focus concentrator, tracking mount and a microprocessor-controlled auto tracking system.

FIBRATECH INC.
5344 13ieme Ave.
Rosemont, Quebec. H1X 2X8
Contact: P. Boisvert
(514) 727-5955

The firm, in conjunction with INRS-Energie and Centre de Recherce Industrielle du Quebec, has developed an improved solar collector. Production techniques and the thermal performance of this plastic, flat-plate liquid collector were optimized, using a grant from the NRC's Solar Energy Program.

GENERAL SOLAR INC.
88F Jamie Avenue
Ottawa, Ontario. K2E 6T6
Contact: William Bell
(613) 225-2077

The firm has evaluated the potential for solar preheating of process water in the pulp and paper industry. The project analyzed the relative value of solar pre-heating when compared with conventional energy reduction techniques. An energy audit was performed on a particular pulp and paper plant with sources of waste energy and potential points for improved conservation were identified. The project was funded by NRC under the Solar Energy Program.

GRAHAM PRODUCTS LTD.
Box 2000
Inglewood, Ontario. L0N 1K0
Contact: D. Graham
(416) 457-5290

The company tested commercially available plastic panel-covers for solar collectors and investigated the methods of improving the performance of polycarbonate and fibreglass reinforced plastics (FRP).

**MANUFACTURING FIRMS** continued

VORTEK INDUSTRIES LTD.

1820 Pandora Street
Vancouver, B.C. V5L 1M5
(604) 251-2451

Contact: Dr. G.G. Albach

This company provides the solar industry with test laboratories in the form of a solar simulator and solar collector indoor test facilities.

## CONSULTING AND ENGINEERING FIRMS

KENNETH A. COOPER (ECONOMIST)

1751 Nanaimo Street
Vancouver, B.C.  V5N 5C1.
(604) 253-8380

The researcher is engaged in the monitoring of a passive solar townhouse in Vancouver to determine the effectiveness of the conservation and passive techniques employed for reducing both the auxiliary space heating and hot water needs. The research is being funded by the National Research Council of Canada under the Solar Energy Program.

CORECO INC.

280 Victoria
Longueil, Quebec.  J4H 2J6

Contact: D. Crevier

An appraisal of seven solar-pond concepts was carried out to determine which would be suitable for space heating in colder climates where seasonal storage is required. The project was funded under a grant from the NRC's Solar Energy Program.

DAVIS ENGINEERING LTD.

1481 Cyrville Road
Ottawa, Ontario.
(613) 746-3760.

Contact: A.J. Fraser
W.R. Davis

The firm has received funds from the National Research Council of Canada under the Solar Energy Program for several research projects in the field of solar energy research. These projects are as follows:

1. Solar domestic hot-water system simulation using a hybrid computer. The objective was to investigate the effect of load profile, draw temperature, and auxiliary heater control strategy on the performance of a solar domestic hot-water system. The simulations showed that interactive controllers in which the auxiliary temperature set point is controlled by solar storage temperature and/or a user set timer should be developed for solar DHW system.

cont....

CONSULTING AND ENGINEERING FIRMS continued

2. Installation and monitoring of the Ottawa Athletic Club solar energy system. The project involved the retrofit installation of a solar heating system to provide hot water for domestic use at the Club. Performance data for the solar hot-water heating system installed at the Ottawa Athletic Club is to be obtained and analysed.
3. Further monitoring of the Aylmer solar heated senior citizen's apartment building.

ENERMODAL ENGINEERING LTD.
Contact: Mr. Steve Carpenter

421 King Street North
Waterloo, Ontario. N2J 4E4
(519) 884-6421

The firm has been sponsored by the National Research Council of Canada under the Solar Energy Program to conduct research in the area of solar energy testing and analysis. The projects are described as follows:

1. Feasibility study for a high performance solar water wall.
   The project evaluates the possible configurations for an improved passive/hybrid solar water-wall space-heating system. After comparison with present systems, using computer modeling, the best system configuration will be selected and a prototype designed.

2. Solar collector design: review of thermal performance prediction techniques. This review surveys and evaluates the currently available collector modelling techniques. The final report presents a useful compendium of available tools and knowledgeable recommendations regarding their use in collector design.

3. A guide to rock bed storage units. The project will develop a manual for the design and construction of a rock-bed thermal storage unit.

GIFFELS ASSOCIATES LTD.
Contact: E. Hoel

30 International Boulevard
Rexdale, Ontario. M9W 5P3
(416) 675-5950

A NRC-funded project to investigate the feasibility of solar heating large water storage tanks, specifically tanks for industrial fire protection systems.

## CONSULTING AND ENGINEERING FIRMS continued

**BRUCE D. GOUGH AND ASSOCIATES**

Studio 21, 53 Queen Street
Ottawa, Ontario.
K1P 5C5.
(613) 232-5393

The researcher was involved in monitoring a passive solar-heated building. The objective of the project was to establish the overall thermal performance and passive gain of a 206 square meter residential building using a low level of monitoring equipment. The research project was funded by NRC under the Solar Energy Program.

**ARTHUR D. LITTLE OF CANADA LTD.**

Contact: Mr. James Burke

120 Eglinton Avenue East
Toronto, Ontario. M4P 1E2
(416) 487-4114

The firm was sponsored by the National Research Council of Canada under the Solar Energy Program to survey the United States solar domestic hot-water-heater designs and applications. The project will evaluate packaged solar domestic hot-water systems that have been field tested in the U.S. The survey will assess the costs, problems, and performance associated with the installation, operation, and maintenance of generic systems which have previously been monitored for over 12 months.

**SCANADA CONSULTANTS LTD.**

Contact: C. Milne

436 MacLaren Street
Ottawa, Ontario. K2P 0M8
(613) 236-7179

The National Research Council of Canada has sponsored the consulting firm, under the Solar Energy Program to engage in solar energy research. The projects conducted by the firm are:

1. Detailed evaluation of the theoretical performance of ten passive solar houses. The thermal performance of the passive solar houses was reviewed in terms of solar contribution, internal gains, and purchased heat both for their actual location and for a simulated location.

2. Monitoring a super-insulated passive solar house in Ottawa. A passive low-energy house built in Ottawa by Solterra Developments was monitored to determine the effectiveness of the design and the conservation techniques incorporated.

## CONSULTING AND ENGINEERING FIRMS (United States)

**ENERGY ENTERPRISES**

319 W. Washington Street
Clinton, Illinois
U.S.A. 61727
(217) 935-6474

Presently doing research to determine the feasibility of passive cooling in conjunction with photovoltaic powered fans and pumps.

Future projects include development of photovoltaic-powered remote lighting systems and pumping systems.

## PROFESSIONAL ASSOCIATIONS

### CANADIAN SOLAR INDUSTRIES ASSOCIATION INC.

67A Sparks Street
Ottawa, Ontario. K1P 5A5
(613) 237-7000

The Association promotes the Canadian Solar Industry in Canada and abroad. The Association provides technical facts on all solar equipment manufactured in Canada and an up-to-date inventory of all solar systems, components, parts, and materials manufactured or marketed in Canada.

The Association's members provide expertise in the following fields:

1. Industrial and commercial hot water application
2. Residential water heating
3. Space and process air heating
4. Low Temperature applications
5. Passive solar conservation
6. Photovoltaic Systems
7. Solar Components
8. Research and Development - Canadian manufactured collectors are tested at the world's most advanced solar testing facility and applied to world's most extreme climate

### AMERICAN SOCIETY OF HEATING REFRIGERATION & AIR-CONDITIONING ENGINEERS LTD.

1791 Tullie Circle, NE
Atlanta, Georgia.
U.S.A. 30329
(404) 636-8400

Contact: J. Richard Wright

The Society makes available funds and contributions for research to individuals or firms through its various chapters located throughout the United States and Canada.

Examples of some of the research projects undertaken in 1981-82 are:

1. A solar heat pump heating system with latent heat storage for cold climates is being constructed and evaluated by Concordia University.

Refer to sections 6.0 and 14.4 for descriptions of other current projects funded by A.S.H.R.A.E.

## DEVELOPMENT AND CONSTRUCTION FIRMS

HIGHLANDS ENERGY SYSTEMS LTD.

Contact: B. Tripp

R.R. #5
Orangeville, Ont. L9W 2Z2
(416) 941-5041

The firm has been granted funds by the NRC under the Solar Energy Program to improve control circuit for solar domestic hot water systems. The firm discovered that after the basic steady-state equations describing a solar domestic hot-water system were expanded to include relevant transient and non-linear factors, they were programmed into the "Continuous System Modelling Program" developed by IBM. An offset tracking control circuit was designed and built with storage and collector temperatures as inputs and with an output in the form of bursts of full-power 60-cycle AC.

The work has confirmed that the control concept is valid and workable, and promises several advantages over current on-off or standard proportional control strategies especially in systems with large storage tanks.

UNIES LTD.

Contact: G. Yuill

1666 Dublin Avenue
Winnipeg, Manitoba. R3H 0H1
(204) 633-6363

The firm was involved in the development of a computer simulation study to determine the value of a 'standard day' test of a solar domestic hot-water system. The research was funded by the National Research Council of Canada under the Solar Energy Program. It was found that the heating energy required is dependent only on the draw volume, provided the draw profile is reasonable.

# SECTION 3.0

# DISTRICT HEATING

GOVERNMENT (FEDERAL)

**ENERGY MINES AND RESOURCES CANADA**

Conserv. and Renewable Energy Br.
580 Booth Street
Ottawa, Ontario. K1A 0E4
(613) 995-9447

The Conservation and Renewable Energy Branch of EMR has developed a district heating program for industry. This program is devoted to the study of potentially economic district heating systems. Funding is provided to conduct detailed engineering designs of sites suited to the implementation of district heating systems in the Atlantic Region.

## GOVERNMENT (PROVINCIAL/STATE)

NORTHWEST TERRITORIES
GOVERNMENT SERVICES

Energy Conservation Division
Government of the NWT
Yellowknife, N.W.T.
Canada X1A 2L9
Telex: 034-45531

Contact: J.A. Severn

This department is sponsoring a Canada/Northwest Territories Conservation and Renewable Energy Demonstration Program.

Project inventory:

Generation of electricity by a renewable energy source, wood. This project demonstrates the feasibility of an automated wood gasification plant as the supplier of power and heat to a 37,000 sq.ft. complex (Snowshoe Inn, Fort Providence, N.W.T.) formerly served by diesel. Wood Gas from the gasifier will fuel the engine which in turn will power the 120 kW generator. The jacket heat from the engine radiator, as well as the exhaust heat will be recaptured for community heating.

For other projects see Sections 8.4, 14.1, and 16.0.

**GOVERNMENT** (PROVINCIAL/STATE) continued

PROVINCE OF BRITISH COLUMBIA
MINISTRY OF MUNICIPAL AFFAIRS

Policy and Research Branch
747 Fort Street
Victoria, British Columbia
V8W 3E1

Contact: Mr. Gary Paget
Senior Policy Analyst

The Ministry was responsible for the planning of the new community of Tumbler Ridge (a coal town) currently under construction in the Northeast region of the Province. Energy considerations were built into the planning of the project and an analysis of integrated energy systems and the feasibility of district heating the town site core will be investigated. The study will determine the overall energy needs for the community and will explore the use of alternative fuels in response to those needs with specific reference to a district heating system from the cogeneration of electricity using municipal refuse and coal waste. The work is being undertaken by Cogeneration Associates Ltd. of Toronto and is managed by Dalton Minty, CMHC, Ottawa.

GOVERNMENT (MUNICIPAL)

CITY OF EDMONTON

City Clerk's Office
Edmonton, Alberta

District Heating Study. To determine the technical and economic feasibility of using waste heat from the Rossdale Generating Station to provide district heating in downtown Edmonton buildings. Study was produced by Stanley-Econo, Edmonton, 1980.

## CONSULTING AND ENGINEERING FIRMS

THE CAMBRIAN ENGINEERING GROUP LIMITED

2465 Cawthra Road
Mississauga, Ontario. L5A 3P2
(416) 272-1400

Contact: Bernie Andrzejewski

The firm provides design engineering, procurement, project management and construction supervision services to governments and industry. The company also maintains a research and development laboratory for undertaking programs for clients, mainly in food processing or on environmental problems.

The firm is involved in a project with Chromalox Canada Limited to develop a Thermosyphon Heat Exchanger to extract heat from stack gases. This heat would then be made available to heat basements of homes, etc. The program was funded by the federal government.

The firm has also undertaken various other projects. Refer to Sections 6.0, 11.0, 14.1 and 14.4.

DILLON CONSULTING ENGINEERS AND PLANNERS

47 Sheppard Ave. E.
Willowdale, Ontario
(416) 229-4646.

Contact: Mr. Daniel Paquette
Planner

Dillon Engineers and Planners are involved with many aspects of energy-efficient designs.

Examples include:

1. District Heating Studies.

For further projects see Sections 1.0, 2.1, 4.1, 6.0, 8.0, 11.0, 12.0, and 18.0.

ECODOMUS DEVELOPMENTS LTD.

880 Wellington Street, Suite 212
Ottawa, Ontario.
K1R 6K7.
(613) 741-9402

Contact: Leo McCuaig

Refer to Section 2.1 for a full description of the project.

## CONSULTING AND ENGINEERING FIRMS (continued)

| | |
|---|---|
| STANLEY-ECONO | 10512 - 169 Street<br>Edmonton, Alberta. T5P 3X6 |
| Contact: David Gill | (403) 483-4777 |

Refer to section 11.0 for a detailed description of the firm's services and projects.

## RESEARCH INSTITUTIONS

### BUILDING RESEARCH ESTABLISHMENT

Department of the Environment
Building Research Station
Garston, Watford
England WD2 7JR
74040 ext. 7151

Contact: Dr. D.J. Fisk
Head of Mech. and Elec.
Engineering Division

The majority of the BRE research programs supports the Dept. of the Environment in its policy responsibilities for housing, energy conservation and environmental protection. The BRE is divided into the Geotechnic and Structures Department, the Fire Research Station, the Environment and Design Department, the Materials and Construction Department and the Princes Riseborough Laboratory.

Program inventory:

District Heating. The objectives were to establish the efficiency in use of existing district heating systems, the methods of allocating costs to households, and to identify the most cost effective means of improving existing district heating systems. A report on the performance of clorius evaporative meters has been published and assessment has begun of alternative methods of allocating charges. Following completion of field monitoring of heat demand on a large district heating scheme, analysis has begun of means of reducing costs through better heat load design, to be confirmed from measurements being undertaken at a district heating scheme in Basildon.

For projects completed in other areas see Sections 2.4, 5.0, 8.4, 10.0, 11.0, and 17.0.

## ARCHITECTURAL FIRMS

JOHN HIX ARCHITECTS

Contact: John Hix

282 Borden Street
Toronto, Ontario. M5S 2N6
(416) 533-8529

Refer to Section 1.0 for a detailed description of the firm's services and projects.

# SECTION 4.0

# WIND ENERGY

# SECTION 4.1

## DESIGN

## RESEARCH INSTITUTIONS

**UNIVERSITY OF ALASKA**

Contact: Professor T. Neils Davis

901 Koyukuk Avenue South
Room 10, Arctic Health Bldg.
Fairbanks, Alaska.
U.S.A. 99701

Research involving the mapping of the wind power potential of Alaska and investigations of the turbulent characteristics of winds at many locations where there is high topographic relief will contribute to developing the use of wind as an energy source.

Several researchers are investigating meteorological constraints on solar energy available to the State, evaluating designs for active and passive systems to extract solar energy and developing design criteria for Alaskan users of solar energy.

## CONSULTING AND ENGINEERING FIRMS

DILLON CONSULTING ENGINEERS AND PLANNERS
Contact: Mr. Daniel Paquette
Planner

47 Sheppard Avenue East
Willowdale, Ontario
(416) 229-4646

Dillon Engineers and Planners are involved with many aspects of energy-efficient design.

Examples include:

1. Paul Band, Wabamum Indian Reserve Alberta. For the Department of Indian and Northern Affairs.

For further projects see Sections: 1.0, 2.1, 3.0, 6.0, 8.0, 11.0, 15.0 and 18.0.

MARSHALL MACKLIN MONAGHAN LIMITED
Contact: D.W. Beasley

275 Duncan Mill Road
Don Mills, Ontario. M3B 2Y1
(416) 449-2500

Refer to Section 14.1 for a detailed description of the firm's services and projects.

## MANUFACTURING COMPANIES

**DAF INDAL LTD.**

3570 Hawkestone Road
Mississauga, Ontario.
L5C 2V8
(416) 275-5300.

DAF Indal Ltd. in collaboration with the National Research Council of Canada has designed an efficient and reliable family of machines referred to as the Vertical Axis Wind Turbine (VAWT).

Some of the VAWT in operation can be found in:

1. Churchill, Manitoba
2. Holyrood, Newfoundland
3. Vancouver Island, British Columbia
4. Rottnest Island, Australia

**WIND DYNAMICS LTD.**

Contact: Jack Otis, President

Box 506
Coleman, Alberta
T0K 0M0
(403) 563-3101.

Wind Dynamics are involved in the production of wind energy apparatus.

Products include:

1. The Jacob Wind Electric Generator. Two models are available (1800 watt and 4000 watt) and can be wired to a meter. All energy which is produced by the wind goes to any lights or appliances being used or returns back to the utility if excess energy is produced.

# SECTION 4.2

## PRODUCTS

## MANUFACTURING FIRMS

**DAF INDAL LTD.**

3570 Hawkestone Road
Mississauga, Ontario. L5C 2V8.
(416) 275-5300.

The firm manufactures the Vertical Axis Wind Turbine. In collaboration with the National Research Council of Canada, DAF INDAL Limited has designed an efficient and reliable family of vertical axis wind turbines (VAWT).

Some of the VAWT are found in operation in:

1. Churchill, Manitoba
2. Holyrood, Newfoundland
3. Vancouver Island, B.C.
4. Rottnest Island, Australia.

**FUTURE RESOURCES AND ENERGY LTD.**

Contact: Fred Drucker

P.O. Box 1358, Station B
Downsview, Ontario. M3H 5W3
(416) 630-8343

The company engineers and distributes Elecktro, Swiss-made, wind generators. Windpower is available where it is difficult or impossible to obtain conventional electric power, such as the remote areas of Canada and the arctic. Harnessing wind power will enable man to exist and to work in areas which, so far, have been uninhabitable.

Batteries for windgenerator service supplied by Surrette Battery Ltd. P.O. Box 2020 Springhill, Nova Scotia, B0M 1X0 and Trylon towers supplied by The Wind Turbine Company of Canada Ltd. 21 Howard Avenue, Elmira, Ontario N3B 2C9.

**THERMAX CANADA LTD.**

Contact: Ernest Higginson
Mr. C. Kerr, Engineer

39 Main Street
Vankleek Hill, Ontario. K0B 1R0
(613) 678-3322.

The firm distributes renewable energy products and systems. The firm's products utilizing wind energy include:

1. Voltage Regulators - Model TC25R12
2. Power Inverters - PV Series Static inverters
3. Vertical Axis Wind Generators - Thermax TC25G DC Generator and the Helius Wind Generator TC25WG and Rotor Kit

cont....

MANUFACTURING FIRMS (continued)

4. Utility Motors - Model TC3M
5. Tower Assemblies for wind rotors - Model TC25T
6. Wind energy information and construction kits.

In addition, the firm is currently involved in the development of an all-weather Darrieus vertical axis wind generator which produces heat or electricity generation. The project is in the development stage and is expected to cost $400,000 to develop. The current test site is at Vankleek Hill, Ontario.

Future Developments include:

1. A low-ambient temperature heat and electric storage system.

WIND DYNAMICS LTD.

Box 506
Coleman, Alberta. T0K 0M0
(403) 563-3101

Contact: Jack Otis

The firm rebuilds Marcellus Jacobs wind generators for resale. Two models available are the 1800 watt and the 4000 watt which can be wired to a meter.
The company also builds Wilks Cam Water Pumping Windmills. The small machine requires 15 m.p.h. winds and can pump up to 100 gallons of water/minute depending on wind speed and size of cylinder. (12', 18' and 25' windmills).

## SECTION 4.3

## CONSTRUCTION

## GOVERNMENT (PROVINCIAL/STATE)

STATE OF ALASKA DIVISION OF ENERGY
AND POWER DEVELOPMENT

Contact: Mr. Steve Baden
Public Information Officer

338 Denali
7th Floor, MacKay Building
Anchorage, Alaska
U.S.A. 99501
(907) 276-0508

The Alaska Division of Energy and Power Development's primary concern is the development, management and efficient use of Alaska's energy resources and the conservation of energy.

Project Inventory:

1. Nelson Lagoon Wind Demonstration Project.
   Nelson Lagoon, a small Community of 50 people located on the Alaskan Peninsula near Cold Bay, has been the site of a project to test a community-scale wind system. The project has successfully demonstrated the technical capability of using a wind system tied into a small diesel-powered electrical grid. Water and salt spray damaged the prototype generator and resulted in its deactivation. A new, modified Grumman Windstream 33 18kW wind generator was installed in the spring of 1982 with monitoring instrumentation.

2. Newhalen Wind Project.
   On the shores of Lake Illiamna, Newhalen is the site of a Public Health Service-constructed washeteria. The 8kW Stormaster that was originally installed to provide power for the community facility will be replaced by a 10kW Jacobs wind machine. Any excess power will be used for resistive heating of the building's water supply.

3. Sheldon Point Wind Demonstration Project.

4. Skagway Wind Demonstration.
   A 10kW Jacobs Wind machine was activated in early 1982. The wind system is inter-tied to the utility grid and provides power for municipal buildings. The project is being financed by the Alaska Power Authority.

cont....

GOVERNMENT (PROVINCIAL/STATE) continued

5. Unalakleet Wind Project.
   The concept of a wind farm is being tested by the State. Three 10kW Jacobs wind systems were tied to the Unalakleet Valley Electric Cooperative electrical grid to provide power to the community of Unalakleet, in the summer of 1982.

6. Port Alexander Residential Wind Project. Grants to residents to install wind generators.

7. Kotzebue Wind Project. Kotzebue was selected as the site for a large (50-200kW) generator demonstration. The system will be tied into the community's power grid.

8. Holy Cross Wind Project. Wind power will furnish electricity and heat to a portion of a public building.

9. Bering Straits Wind Project. Installation, instrumentation and monitoring for one year of wind generation system installed for four Alaskan villages: Golovin, Shishmareg, Teller and White Mountain. Based on the performance of this system, a plan will be drawn up for the villages of Buckland, Savoonga, Wales, Brevig Mission and Diomede by January 1984.

10. Wind Cost Effectiveness Study. The Division will undertake an economic evaluation of wind energy systems currently in operation in the State and will provide analysis on the options of use of the technology.

## CONSULTING AND ENGINEERING FIRMS

**NOVAMETRIC ENGINEERING**

P.O. Box 8163, 222
Cardinal Crescent
Saskatoon, Saskatchewan.
S7K 6C4
(306) 373-4965

Contact: Allan Bens

Refer to Section 16.0 for a detailed description of the firm's services and projects.

# SECTION 4.4

# RESEARCH

## RESEARCH INSTITUTIONS

### UNIVERSITY OF ALBERTA

Dept. of Mechanical Engineering
Edmonton, Alberta. T6G 2G8

Contact: Dr. J.D. Dale
Dr. T.W. Forest

Major research interests in this area are in wind engineering including air pollution in urban areas and irregular terrain, control of snow drifting, wind loads on structures and pedestrian comfort and wind chill. Professor D.J. Wilson is in charge of this project.

The University is also involved in other areas of research. Refer to Sections 2.4, 6.0 and 17.0.

### UNIVERSITY OF CALGARY

2500 University Drive N.W.
Calgary, Alberta. T2N 1N4
(403) 284-5731

Dr. P.J. Vermeulen is involved in "cold climate" and "energy-related" research in the area of wind energy, solar energy, efficiency of combustion, and accoustically-excited combustion processes.

Refer also to Sections 14.4 and 2.4 for information on the university's research.

## SECTION 5.0

## INFORMATION AND EDUCATIONAL SERVICES

## GOVERNMENT (FEDERAL)

CANADIAN INSTITUTE FOR SCIENCE AND TECHNOLOGICAL INFORMATION

CISTI Energy Library
NRC Building, M-55
Ottawa, Ontario. K1A 0S2
(613) 993-1600

The Institute provides a bibliographic information service on the topics of energy conservation, and energy-efficiency strategies to name a few.

ENERGY, MINES AND RESOURCES CANADA

580 Booth Street
Ottawa, Ontario. K1A 0E4
(613) 995-9351

Contact: Energy Resource Info Div.
Energy Policy Coordination,
Energy Sector

This division supplies public information and answers general inquiries about energy statistics.

Contact: Conservation and Renewable Energy Office

580 Booth Street
Ottawa, Ontario. K1A 0E4
(613) 995-9447

Project Inventory:

1. This branch of EMR has created the Super Energy-Efficient Housing Demonstration Program, which will provide $6 million to construct approximately 1000 super energy-efficient housing units across Canada from 1981 to 1984. Funding under the program (avg. $6000 per house) must be used to assist in the design and evaluation of houses constructed in the program, to train builders and trades people in the appropriate techniques involved in construction.

   Refer also to section 13.0.

2. Ener$ave Advisory Service. A national information centre responsible for promoting home energy conservation and substitution of oil with other forms of home heating. Its services include offering a free computerized analysis of a householder's insulation requirements and operating the HEATLINE.
   Information is also available on renewable energy forms such as solar, biomass, wind, geothermal, tidal and ocean energy, small-scale hydroelectric power, and new technologies such as heatpumps.

cont....

GOVERNMENT (FEDERAL) continued

The HEATLINE is a toll free telephone advisory service that responds to general and technical questions on home energy conservation and the Canada Oil Substitution Program (COSP). The program is scheduled to conclude at the end of 1982.

Contact:

Ener$ave Advisory Service
P.O. Box 4510, Station E
Ottawa, Ontario K1S 5K3
(613) 995-1801

3. Government Facilities Retrofit Program for Crown-Owned Buildings. The purpose of this program is to implement capital-intensive, cost-effective energy conservation measures to reduce energy consumption in federal government buildings. This will be achieved through three initiatives:

   1) implementation of restrictive measures for the control of environmental systems
   2) implementation of improved routine preventive maintenance of installed building systems
   3) the conducting of energy audits and analyses leading to retrofit of building enclosures and installed electrical mechanical systems.

4. Industrial Energy Management Program. This cooperative program among the Canadian Manufacturers Association, CREB, and the 16 Industry Task Forces is designed to assist all manufacturing companies, regardless of size, to reduce energy costs by providing technical information training sessions and related advice. ($240,000 over two years).

5. Industry and Commerce National Energy Audit Program. Will assist industrial and commercial establishments to identify areas of energy waste and to plan and implement corrective measures. The federal government will provide funds over three years between 1981 and 1984 to be applied on the basis of a cost-sharing ratio with the provinces. Industries and commerical buildings will be eligible for on-site energy audits and follow-up consultant advice grants.

6. Industry and Commerce National Energy Bus Program. The federal government and participating provincial governments provide a free service to industry and business to identify energy waste and opportunities to reduce energy consumption and costs. By means of mobile, computer-equipped vehicles, on-site plant audits are conducted to analyse energy use patterns and recommend corrective measures.

cont....

Program administration is the responsibility of the provinces.

7. Industry and Commercial Task Forces. Low cost energy conservation initiatives are stimulated by studies undertaken by Task Forces on sectorial energy conservation potential. The commercial sector task force holds workshops and seminars and conducts studies to improve awareness of energy conservation opportunities in the commercial sector.

8. Small Projects Fund. Stimulation of the implementation of energy conservation opportunities in the area of buildings and urban energy through support of workshops and seminars pilot demonstrations, publications and studies. The CREB has allocated $300,000 per annum for this project.

9. Energuide - Energy Consumption Labelling of Appliances. To improve consumer awareness of the energy efficiency of major household appliances, thereby inducing manufacturers to accelerate and extend the introduction of cost-effective appliance conservation technologies. ($2.5 million through 1986).

10. Municipal Energy Management Program. To assist Canadian Communities in hiring full-time energy managers, funding is available to pay the first year salaries of about 900 municipal energy managers contingent upon agreement by municipalities to continue funding for one additional year. The program is expected to increase energy savings in:
    1) energy management of municipal buildings, vehicle fleets, street lighting, water and sewage treatment
    2) review of services, by-laws and municipal planning to analyze relevant regulations with the view to promoting energy savings, and
    3) community involvement by providing guidance to community organizations to promote conservation.

11. Accelerated Demonstration of Solar Domestic Water Heating. Designed to assess the overall feasibility of residential water heating using solar energy and involving the mass production and installation of solar technology. More than 800 systems are to be installed in new and existing homes specified in nine selected projects across Canada.

12. Research and Development for Energy Conservation and Renewable Energy. $325 million is available for energy research and development in the areas of new and conventional energy sources, new liquid fuels and conservation.

cont....

**GOVERNMENT** (FEDERAL) continued

13. Federal/Provincial Conservation and Renewable Energy Demonstration Program. This program was designed to share the costs with the provinces for the demonstration of renewable and conservation technologies by reducing the technical and financial risks of the first application of the technology. ($133,000 to 1983/84).

ENVIRONMENT CANADA

Fontaine Building
Ottawa, Ontario. K1A 0H3

Contact: Dave Campbell

DRECT. (Development and Demonstration of Resource and Energy Conservation Technology Program). Additional funds are being put into this program which is designed to reduce waste (pollution) at the same time as conserving energy. ($2.6 million 1981 to 1983).

THE HOUSING AND URBAN DEVELOPMENT ASSOCIATION OF CANADA (HUDAC)

15 Toronto Street, 10th Floor
Toronto, Ontario. M5C 2E3.

Contact: Mr. Howard French

HUDAC is a federally-funded organization that develops standards and guidelines for the design and construction of residential buildings and other development. HUDAC works extensively with the CSA, and federal/provincial levels of government.

HUDAC, in association with the Ministry of Energy, has developed an energy conservation demonstration program called "Residential Passive Solar Design and Construction Program." HUDAC has provided the funds for construction of 14 residences incorporating both passive solar and energy efficient techniques. A similar program in Saskatoon, "Parade of Homes," and one in Alberta sponsored by these areas' respective Provincial Departments of Energy have been implemented. A list of contractors involved in design and construction of the 14 homes in Ontario follows:

Thames Valley Engineering (Chatham)
Montheith Ingram Engineering Ltd. (Petrolia)
J.C. Somfay Architect Ltd. (Guelph)
Simm and Martin Associates (Scarborough)
Advanced Idea Mechanics Ltd. (London)
Ross Norris Associates (Stoney Creek)
IBI Group (Mississauga)

cont....

J. Katnick Architect (Ottawa)
Tymura Solar Designs (Thunder Bay)
Ecodomus Developments Ltd. (Ottawa)

Other programs HUDAC is involved in include "The Low Energy Passive Solar Housing Demonstration Program," where 50 homes in 3 subdivisions will be constructed by March '83 and opened for demonstration; "The Super Energy Efficient Demonstration Project," in conjunction with EMR, 300 homes will be built across Canada for demonstration and occupancy.
HUDAC will set up training programs to train builders on how to maintain lower energy consumption levels during the construction phase of new homes. This is done by coordinating the installation periods of electricians, plumbers and other contractors. A "Builders' Guide to Energy Efficiency of New Homes" was produced by HUDAC and is available on request.

INDUSTRY, TRADE AND COMMERCE

235 Queen Street
Ottawa, Ontario. K1A 0H5
(613) 593-7361

Contact: Mr. Hart

IERD. (Industry Energy Research and Development Program), a cost-shared program to encourage research and development of new and improved processes and products to reduce energy consumption in industry. ($6.5 million from 1981 to 1983).

PUBLIC WORKS CANADA

Sir Charles Tupper Building
Confederation Heights
Ottawa, Ontario. K1A 0M2

Contact: (613) 998-9560

The deparment is involved in the following solar programs:

1. PUSH. (Purchase and Use of Solar Heating), a program to install, over six years, solar heating on buildings owned by federal departments and agencies. ($125 million 1979-84).

2. PASEM. (Program of Assistance to Solar Equipment Manufacturers), an arrangement of shared cost contracts with ten Canadian solar equipment firms to help develop, produce and market solar systems.

cont....

**GOVERNMENT (FEDERAL) continued**

3. LEBDA. (Low Energy Building Design Awards), a national competition for Canadian architects and engineers, which culminated in the publication of a book entitled, "Winning Low Energy Building Designs" to promote low energy design of commercial buildings.

See also Section 2.1.

**Q L DATA BASE**

National Research Council of Canada
Div. of Energy
Montreal Road
Ottawa, Ontario. K1A 0R6
(613) 993-9224

Contact: Joan E. Hill

AND

QL Systems Ltd.
112 Kent Street, 1018 Tower 'B'
Ottawa, Ontario. K1P 5P2
(613) 238-3499

Developed and maintained by Energy, Mines and Resources, Ottawa, this computerized data base contains over 1,000 descriptions of federal and provincial energy programs in abstract form. It covers such subjects as Conservation, Fossil Fuels, Nuclear Energy, Renewable Energy, Energy Transportation and Transmission, and indicates the ministry responsible and a contact point.
The QL system also contains an Energy Calendar of energy-related conferences, seminars and other events, both national and international. It is updated monthly by EMR, the provinces, and the private sector via remote terminals and it lists locations, sponsors and contacts.

**ROYAL COMMISSION ON THE NORTHERN ENVIRONMENT**

215 Red River Road, Suite 201
Thunder Bay, Ontario. P7B 1A5
(807) 345-3658

Contact: Jon Del Ben

This is a commission of public inquiry into the northern environment. Some of the public hearings are related to energy.

For more detailed information, please contact Mr. Marc Couse in the Toronto office at (416) 965-9286 for a review of submissions.

**U.S. DEPARTMENT OF COMMERCE**
National Bureau of Standards

Centre for Building Tech.
National Engineering Lab.
Washington, D.C.
U.S.A. 20234

The mission of the Centre for Building Technology (CBT) is to increase the usefulness, safety and economy of buildings through the advancement of building technology and its application to the improvement of building practice.

Under CBT's Building Thermal Performance Division, research concerning passive solar systems and thermal insulation is conducted.

**U.S. DEPARTMENT OF ENERGY**
Technical Information Centre

Box 62
Oak Ridge, Tennessee. U.S.A.

The Technical Information Centre is the central point for collecting, processing, and disseminating scientific and technical information. The centre also provides bibliographic data bases that identify the world's scientific and technical energy literature.

## GOVERNMENT (PROVINCIAL/STATE)

GOVERNMENT OF ALBERTA
Energy Conservation Branch

Contact: Mr. Stephen Tyler

Energy and Natural Resources
Highfield Place, 2nd Floor,
10010 - 106 Street
Edmonton, Alberta. T5J 3L8
(403) 427-5200

This department publishes information for the general public on appropriate technical procedures for energy-efficient residential construction or retrofit. The report, "Low Energy Home Designs: Design Guidelines and Plans for Energy Efficient Housing," is available through this agency. Another report, "Energy-Efficient Housing: A Prairie Approach," details conservation measures for new houses, retrofitting older homes, water heating methods, and information sources.

NORTHWEST TERRITORIES
GOVERNMENT SERVICES

Contact: J.A.Severn

Energy Conservation Division
Government of the N.W.T.
Yellowknife, N.W.T. X1A 2L9
Telex: 034-45531

This department is sponsoring a Canada/Northwest Territories Conservation and Renewable Energy Demonstration Program.

Project inventory:

A television film production of Renewable Energy Sources and Conservation in the Northwest Territories has been produced by the department for use by educational institutions and government departments.

For other projects of this department refer to Sections 3.0 5.0, 8.4, 10.0, 13.0, 14.1 and 16.0.

**GOVERNMENT (PROVINCIAL/STATE) continued**

STATE OF ALASKA DIVISION OF ENERGY AND POWER DEVELOPMENT

Contact: Mr. Steve Baden
Public Information Officer

338 Denali
7th Floor, MacKay Building
Anchorage, Alaska
U.S.A. 99501
(907) 276-0508

The Alaska Division of Energy and Power Development's primary concern is the development, management and efficient use of Alaska's energy resources and the conservation of energy. The Division is part of the Department of Commerce and Economic Development.

Project inventory:

1. Northwest Community College Wind Curriculum. The Division has contracted with the Northwest Community College to develop and conduct training courses on the use and maintenance of wind energy systems.
2. The Division will monitor and assess the 189 Alaskan projects funded by the U.S. Department of Energy concerned with wind power, small hydro projects, solar systems and energy information centers located within public libraries in 1980/81. Information gained from the demonstration will be disseminated by the Division in the form of reports.
3. Education Programs. Coordination and delivery of workshops and seminars for agencies, the general public and professional groups; development of energy curriculum; and assistance to educators are the services provided by the unit.
4. Technical Reference Library. A Technical reference library is being started that will establish an energy documents reference collection. The library will house the Division's technical documents and assist in coordination of energy education material distribution.

STATE OF DELAWARE
Delaware Energy Office

56 The Green
Dover, Delaware
U.S.A. 19901.
(302) 736-5644.

Acts as an information service to individual residents who wish to improve the energy efficiency of their property.

**GOVERNMENT** (PROVINCIAL/STATE) continued

STATE OF MICHIGAN
DEPARTMENT OF COMMERCE

Contact: Tom Stanton

Energy Administration
P.O. Box 30228
Lansing, Michigan.
U.S.A. 48909
(517) 373-0480

The Technical Information Center of the U.S. Department of Energy has established a computer system which includes literature from many countries about all facets of energy use and conservation as well as information about current research projects, including every research project sponsored by the U.S. Department of Energy.

Also, the Michigan Energy Administration is involved in an on-going infrared thermography project. For further detail, refer to section 11.0.

STATE OF NORTH DAKOTA
Energy Extension Service

Box 5626, University Station
Fargo, North Dakota. U.S.A. 58105
(701) 237-7241

This service specializes in residential energy conservation and conservation techniques for small business. The service provides educational programs on techniques for reducing energy needs and utilization of alternatives including solar, wind, wood, coal, and geothermal sources.

GOVERNMENT (MUNICIPAL)

TORONTO HYDRO ENERGY HOTLINE

Toronto, Ontario.
(416) 595-6780

The agency offers energy conservation consultation to residents of the city. Toronto Hydro will also conduct energy surveys to assess areas where energy loss can be reduced.

The other boroughs in Metropolitan Toronto offer similar services to their residents.

## RESEARCH INSTITUTIONS

ALBERTA RESEARCH COUNCIL
11315 - 87 Avenue
Edmonton, Alberta. T6G 2C2
(403) 453-3788

Contact: Dr. T. Rachuk

The following program is funded by the Alberta/Canada Energy Resources Research Fund, a joint venture of Alberta Dept. of Energy and Natural Resources and EMR, Canada.

1. Solar and Wind Energy Research Program (SWERP).

   Objectives of the program are to assess Alberta's solar and wind energy resources using sophisticated instrumentation at strategic locations throughout the province; to upgrade and expand library and technical information services on these resources, and in solar and wind energy utilization relevant to the Western Canadian Climate.
   SWERP's information centre has continued to receive an increasing number of visitors and literature requests from private, government, educational and commercial sectors. Approximately 7,000 items are on file to-date and relevant documents are being added to the data base at a rate of 100 per month.

2. A facility for energy-related research has been constructed in Calgary for groups including the Petroleum Recovery Institute, the Computer Modelling Group, the Canadian Energy Research Institute and the Alberta Research Council. The building is known as the Energy Resources Research Building.

   The council is also involved in a joint program with the Housing and Urban Development Association of Canada (HUDAC).

3. Energy-Efficient Housing Display Program.

   Objectives of the program are to develop and identify practical designs of energy-efficient housing and construction procedures; to stimulate development by builders and manufacturers of energy-efficient and cost-effective construction techniques, materials and methods; to stimulate an awareness within the residential construction industry of the need for more emphasis on energy conservation, and to develop and construct 10 housing models for public viewing and education that optimize energy-efficient designs and construction techniques.

## RESEARCH INSTITUTIONS (continued)

### BRACE RESEARCH INSTITUTE

MacDonald College, McGill Univ.
1 Stewart Park
Ste. Anne de Bellevue, P.Q.
H9X 1C0.
(514) 457-2000.

The institute conducts research in the following areas:

1. Solar Energy Projects - solar collectors of various types, solar cookers, solar wind ventilator dryer, solar heated greenhouses, etc.
2. Wind Energy Projects - wind electric generators, sail windmill for water pumping & agricultural purposes.
3. Biomass Energy Projects - Solar heated biogas digestor, low cost wood and sawdust stoves for cooking purposes.

### INSTITUTE OF MAN AND RESOURCES

49 Dorval Street
Charlottetown, P.E.I. C1A 1A4
Contact: Mr. Dave Murray
(902) 892-0361

The institute's orientation is one of research, development and demonstration. The following is an example of the type of demonstration projects the institute is involved in.

1. Residential Conservation and Space Heating.
   A demonstration in private residences in Charlottetown, of seven advanced wood-fired central heating systems for performance, reliability, safety, convenience, and emission levels. The project showed that forest residues, chipped and pelletized wood can be successfully used in residential heating systems. The cost of the project was $251,711.00 (funded by EMR, Canada).

For other projects see Sections 2.2, 2.4 and 16.0.

### POLLUTION PROBE FOUNDATION

12 Madison Avenue
Toronto, Ontario. M5R 2S1
Contact: Don Chant
(416) 967-0577

Probe is an investigative, educational and advocacy group dedicated to preserving environments threatened by pollution. Man's resource and energy-intensive lifestyle is responsible for the damage inflicted on the environment. Pollution Probe proposes practical alternatives to our lifestyles that are based on research and provide evidence of economic feasibility.

cont...

RESEARCH INSTITUTIONS (continued)

Through its urban demonstration project, Ecology House, Pollution Probe shows people methods of energy conservation that can be added to a home, such as super insulation and passive or active solar systems. The original house included little insulation, glazed windows and an oil furnace that worked at low efficiency. The second stage in the house's evolution included super insulation, caulking and weatherstripping, triple-glazed windows and vapour barrier installation. Stage three includes construction of a trombe wall, passive and active solar systems, two greenhouses and a gas furnace conversion at 70% efficiency. A wood stove, hydroponic gardening, shutters and a composting toilet were installed to demonstrate to urban dwellers the cost savings in money and resources through waste management techniques. Each of the stages is a progression towards energy efficiency.

For more information on Ecology House, please contact the Pollution Probe Foundation.

RYERSON POLYTECHNICAL INSTITUTE

Contact: Ken Burkhardt

Energy Information Service
50 Gould Street
Toronto, Ontario. M5B 1E8
(416) 595-5071

The Energy Information Centre provides information on all aspects of energy research and information.

SOLAR APPLICATIONS AND RESEARCH LTD.

Contact: Roger Bryenton

3683 West 4th Avenue
Vancouver, B.C. V6R 1P2.
(604) 733-5631

This Canadian company provides technical services to assist in the application of energy conservation and solar energy techniques thereby reducing the dependence on non-renewable resources.
Services are directed towards industry and design professionals, the building trades, educational institutions, as well as homeowners.

Since 1974, SAR has been responsible for the design and construction of many passive solar/energy-conserving buildings, as well as studies and designs for other systems utilizing solar energy.

cont....

Specific areas of service include:

1. Site and building analysis
2. Solar energy utilization
3. Additional Energy Conservation
4. Legislation
5. Education and instruction in such areas as passive/active residential design, retrofit design and analysis, wind power, greenhouse design, solar technologies and components.

Research and studies are conducted across Canada. For a more detailed description, please contact SAR directly.

Also listed under Sections 2.1 and 6.0.

TRENT UNIVERSITY

Contact: W.P. Adams

Department of Geography
Peterborough, Ontario.
(705) 748-1553

The university operates a community 'storefront' energy conservation service to the residents of Peterborough and the surrounding area. Under the direction of Professor W.P. Adams, the university conducts a modest amount of research into local energy conservation issues.

**RESEARCH INSTITUTIONS** (United States)

UNIVERSITY OF ALASKA

Contact: Keith B. Mather

901 Koyukuk Avenue South
Room 10, Arctic Health Bldg.
Fairbanks, Alaska.
U.S.A. 99701

Created a Solar Design Manual for Alaska, funded in part by the Alaska Department of Transportation and Public Facilities. The manual begins with a short course on solar energy and a discussion of common applications. The manual also discusses the direct conversion of solar energy to electricity using photo-voltaic cells. This application is widely used where small amounts of power are needed at remote locations (such as railroad crossing lights and battery-powered runway lights).

## RESEARCH INSTITUTIONS (Foreign)

**BUILDING RESEARCH ESTABLISHMENT**

Contact: Dr. D.J. Fisk

Department of the Environment
Building Research Station
Garston, Watford
England WD2 7JR
(0927 3) 74040 Ext. 7151

The majority of the BRE Research Programs support the Department of the Environment in its policy responsibilities for housing, energy conservation and environmental protection.

Refer to Sections 2.1, 2.4 and 5.0 for information on additional projects.

## CONSULTING AND ENGINEERING FIRMS

BIRD AND HALE LTD.
Consulting Engineers
and Biologists

1263 Bay Street
Toronto, Ontario
M5R 2C1
(416) 925-1147

617 Queen St. E.
Sault Ste.Marie
P6A 2A6
(705) 942-1640

The firm is comprised of Engineers and Biologists concerned with airphoto interpretation, biophysical inventories and environmental assessments, refuse and solid waste systems and remote sensing.

Project Inventory:

1. Investigation of the feasibility of establishing a Cold Climate Testing Facility at Ryerson Polytechnical Institute, Toronto. The project is in the preliminary phase, initiated by Ian Hale with the cooperation of the Centre for Industrial Development at Ryerson. 1982.

Refer to Section 19.0 for another project description.

CURRIE, COOPERS AND LYBRAND
Contact: Nancy Pinnington

145 King Street West
Toronto, Ontario. M5H 1J8
(416) 366-1921

The management consulting firm is involved in projects relating to information and education concerning energy conservation.

In conjunction with the Ontario Ministry of Energy, the firm has produced a brief description of all the various projects and other responsibilities of the senior advisors to the Deputy Minister of Energy in the Conventional Energy Group.

Refer to Sections 6.0, 14.4 and 18.0 for a more detailed description of the firm's projects.

IBI GROUP
Contact: Harold J. Katzin

156 Front Street West, 6th Floor
Toronto, Ontario. M5J 2L6.
(416) 596-1930

The firm conducts Energy Saver Program Seminars on energy conservation in housing. These seminars are sponsored by the Department of Energy Mines and Resources and HUDAC.

Refer also to Sections 1.0, 2.1, 2.2, 8.4, 11.0, 14.1, 14.3 and 14.4.

## CONSULTING AND ENGINEERING FIRMS (continued)

**SANDERSON, ASHBY CONSULTING LTD.**
301 - 336 5th Avenue North
Saskatoon, Saskatchewan
Contact: Jack Ashby
(306) 244-6644

Information services offered include a slide presentation on energy-efficient housing. The education and administration aspects of energy conservation in low rise residential housing are stressed.

**WASHBURN & GILLIS ASSOCIATES LTD.**
70 York Street
Fredericton, N.B. E3B 3N5
(506) 454-0213

The firm specializes in environmental consultation. They have developed an energy education demonstration project which has produced manuals and kit materials on energy conservation in space heating for students and teachers.

Refer also to Section 11.0 for a description of the firm's other services and projects.

**WOOD BURNING CONSULTANTS CDA. LTD.**
6 Olivers Lane
Cobourg, Ontario. K9A 4K2
Contact: J.M. O'Grady
(416) 372-5893

Primarily involved in the education/training portion of the solid fuel industry. They offer courses on Wood Fuel Technology, both privately and through colleges and industries. The agency has carried out small scale research on the incidence of chimney fires and has created standards for the Canadian Chimney Sweeps Association.

## INFORMATION AND DEMONSTRATION AGENICES

**THE CANADIAN CLIMATE CENTRE**

Atmospheric Environment Service
4905 Dufferin Street
Downsview, Ontario. M3H 5T4

Contact: Rick Lawford

The centre coordinates the Federal Government's research in the area of the climate and environment.

**CONSERVATION COUNCIL OF NEW BRUNSWICK**

180 St. John Street
Fredericton, N.B. E3B 4A9
(506) 454-6062

With financial assistance from the Federal Department of Energy, Mines and Resources and the New Brunswick Energy Secretariat, the Conservation Council has renovated a three story, 4,000 sq. ft. house incorporating many renewable and energy saving systems. Known as Conserver House, the structure operates as an energy information centre to assist people who want to learn about, and take advantage of conservation and renewable energy methods and products.

The Council is planning to develop a Class A energy audit capability to complement other educational programs offered.

**ENERGY CONSERVATION INFORMATION CTR.**

95 - 23rd Street East
Saskatoon, Sask. S7K 6M9
(306) 664-8848

Contact: Sheryl Siemens

The centre serves about 170,000 people in central Saskatchewan and is one of the earliest and most successful community energy conservation projects in Canada. In operation since 1978, the centre acts as a valuable complimentary operation to the world leading research into energy-efficient housing taking place in the province. By providing up-to-date conservation information, programming energy education workshops and operating a variety of technical services, the centre successfully presents the research knowledge in a useful form to the public.

## INFORMATION AND DEMONSTRATION AGENCIES (continued)

ENERGY RESOURCES CONSERVATION BOARD Calgary, Alberta

The Board is developing an Energy Resources Data System, which will consolidate, improve and expand the existing computer files of the Energy Resources Conservation Board (ERCB) on crude oil, natural gas, coal and oil sands. A user-oriented data management system will be developed to capture, store and secure the data, and make it more accessible to the government and private sector.

KORTRIGHT CENTRE FOR CONSERVATION

Metro Toronto and Region
Conservation Authority,
5 Shoreham Drive
Downsview, Ontario. M3N 1S4
(416) 661-6600

Contact: Mr. Paul Leitch

The centre is an interpretive/educational building for natural resources based on the exploration of themes. Their most recent theme, Renewable Energy, will help to illustrate concepts, uses, methods and benefits of utilizing renewable energy forms.
Components such as solar, wood, wind, hydraulic and conservation will be described via audio-visual presentations, indoor exhibits, outdoor demonstrations, workshops and hikes. The project is funded by the Ministry of Energy and organized by the Ministry of Agriculture and Food, and the Metro Conservation Authority. It will be completed by March 1984.

The Centre is currently preparing for a 10kw wind energy conversion system to be installed on site.

SWIFT CURRENT REGIONAL AGRICULTURE STATION

P.O. Box 1030
Swift Current, Sask. S9H 3X2
(306) 773-4621

Contact: Dr. H.R. Davidson

This agency offers seminars to homeowners and prospective home buyers on energy conservation, seminars to farmers regarding energy-efficient livestock shelters and also on grain drying.

Dr. H.R. Davidson was technical program chairman for the International Conference in Regina (Energex - 1982) that investigated all aspects of energy conservation.

## INFORMATION AND DEMONSTRATION AGENCIES (continued)

URBAN ENERGY CENTRE

Contact: Lynn Currie

Sheridan College
McLaughlin Road, Box 7500
Brampton, Ontario. L6V 1G6
(416) 459-7533

The Centre is a primary source of information and instruction on energy-related topics. It is a joint venture of the Regional Municipality of Peel, Sheridan College and the Ministry of Energy established in April of 1981.

The centre organizes and runs workshops, seminars and courses on topics ranging from installing solar panels on the home to alternative fuels. Services offered by the centre include information on: installing vapour barriers, calculating adequate insulation levels, energy surveys in commercial and industrial buildings, heat load calculations, conducting home energy survey workshops through the Residential Energy Advisory Program (REAP) administred by local utilities, tours of energy-efficient homes, greenhouses, automated energy control systems and energy conservation for power engineers.
The centre also collects and distributes information on energy systems from federal, provincial, regional and municipal sources, keeps consumer product referral information from manufacturers on file and acts as a liaison between energy interest groups.

Many programs are held in the Enercon Building at the Brampton Campus. It is a community-oriented building that gives the public a chance to see a number of alternative energy systems and have "hands-on" experience with them.

VANIER CENTRE FOR ENERGY ALTERNATIVES

Contact: Terry Tamblyn

North York Board of Education
3000 Don Mills Road East
Willowdale, Ontario. M2J 3B6
(416) 493-3160

The demonstration project, a solar-heated school portable, is located on the grounds of the George Vanier Secondary School. A slide show and discussion provides students with information regarding energy conservation and alternatives. (grades 4-13).

An active air solar system was installed which assists space heating. The future phases of this project include insulation of the portable to make it energy-efficient, addition of thermal storage for the solar heat and installation of an active solar domestic hot water system.

## INFORMATION AND DEMONSTRATION AGENCIES (United States)

CONSERVATION AND RENEWABLE ENERGY INQUIRY AND REFERRAL SERVICE

P.O. Box 8900
Silver Spring, Maryland
U.S.A. 20907
(800) 462-4983

Contact: Brad Schepp

Operated by the Franklin Research Center under contract to the U.S. Dept. of Energy, this service (successor to the National Solar Heating and Cooling Information Center) provides information on topics such as active and passive solar energy, energy conservation, wind energy, photovoltaics, bio-conversion, wood heating, solar thermal, small-scale hydroelectricity, alcohol fuels, and ocean energy.
Information is the form of brochures, factsheets, bibliographies, individually tailored responses and referrals to trade associations, researchers, state and local groups, federal agencies, special interest groups, private consultants and professional associations.

NEW ENGLAND SOLAR ENERGY ASSOCIATION

P.O. Box 541
Brattleboro, Vermont
U.S.A. 05301
(802) 254-2386

Contact: Tom Minnon

NESEA is a non-profit membership organization that provides education on solar energy for New England and other cold climates. NESEA publishes a bi-monthly newsletter, holds 2 major conferences each year and sponsors seminars and workshops.

## PROFESSIONAL ASSOCIATIONS

CANADIAN ELECTRICAL ASSOCIATION
1 Westmount Sq., Ste.580
Montreal, Quebec. H3Z 2P9.
(514) 937-6181.

CEA is a Canadian industrial association which deals with electrical energy research and development.

Refer to Section 6.0 for a description of other projects.

RENEWABLE ENERGY IN CANADA
334 King Street East, #206
Toronto, Ontario
(416) 363-9431

Contact: Robert Argue

This non-profit, federally-incorporated company acts as consultants in the field of energy-efficient design and construction for all levels of government. Its larger role lies in publishing books related to renewable energy and energy-efficient construction, and producing seminar series, audio-visual packages, booklets and brochures related to low-energy construction.

# SECTION 6.0

# CONSERVATION AND RENEWABLE ENERGY

GOVERNMENT (FEDERAL)

ENERGY MINES AND RESOURCES

Earth Physics Branch
1 Observatory Crescent
Ottawa, Ontario.

Energy, Mines and Resources Earth Physics Branch is continually working in the area of permafrost and geothermal research. Some of the current work is in collaboration with the University of Calgary.

ENERGY, MINES AND RESOURCES

460 O'Connor Street
Ottawa, Ontario
(613) 996-1118

Contact: Charles Ficner

The department conducts a variety of research, demonstration, technology transfer, product development, standards development, and policy and analysis studies. These studies are underway on energy conservation in new and existing residential and commercial buildings.

For information about specific projects, contact the above address.

Several branches of EMR Canada offer energy-related programs which are outlined below:

EMR, Conservation and Renewable Energy Branch: (613) 995-9447

Alternative Transportation Fuels Research and Development Program. Funding of up to $100 million will be available for research and development of new liquid fuels between 1981 and 1983. The government expects research funds from Canadian industries and provincial governments to supplement this initiative.

EMR, Research and Technology Branch: (613) 995-9488

Energy Research and Development Program. The program looks at several priority areas of new research and development such as alternatives to gasoline in the transportation sector, increased efficiency of energy use in all sectors of the economy, and new energy sources ranging from coal to hydrogen.

GOVERNMENT (FEDERAL) continued

NATIONAL RESEARCH COUNCIL
OF CANADA

Division of Energy and
Building Research
Montreal Road
Ottawa, Ontario. K1A 0R6
(613) 993-2730

Contact: Dr. J.P. Rollefson

The Division of Energy at NRCC maintains high quality research and development programs in the renewable energy areas of biomass, solar, wind, hydraulic, geothermal and peat, with emphasis on effective Canadian industrial participation.

The NRCC's "Solar Energy Research and Development Program. is a national program begun in 1976 to establish where and when solar energy can be used to advantage in Canada. The program sponsors, encourages and promotes developments of solar technology and an industrial capability based on that technology. The program is funded under the Federal Government's Energy Research and Development effort. Funding levels for 1981 were $10 million. Approximately 250 contracts (secured from proposals of builders and engineers) in force, most for 18 month periods. A list of these projects is in the NRCC Solar Energy Program Contract Registry 1981-1982.

The Division of Building Research at NRCC provides the Canadian Construction Industry with a national research facility equipped to study problems that are unique to Canada because of its climate, geography and raw materials.

Research projects have been carried out in the following areas:

1. Performance/Durability Testing of Building Materials.
2. Structural Safety.
3. Noise and Vibration.
4. Thermal Performance and Properties involves passive solar heating, heat pumps predicting energy consumption in houses, lighting studies, energy use and conservation, (as well as determining thermal characteristics of insulation and of components such as walls, windows, doors and ceilings).
5. Fire Research.
6. Energy Use and Conservation.
7. Geotechnical involves foundations, frost action, building on permafrost, avalanche prevention and control.

GOVERNMENT (FEDERAL) continued

NATIONAL RESEARCH COUNCIL OF CANADA
Division of Building Research
Prairie Regional Station
Saskatoon, Sask. S7N 0W9

Contact: C.P. Hedlin

Project inventory:

1. Studies of energy consumption in houses - gross consumption and some submetering - particularly on low energy houses.
2. Studies of gross energy consumption using data from utility companies.
3. Air infiltration and air leakage studies in houses.
4. Five private residences in Saskatchewan were designed by the NRCC to incorporate thermal envelopes. Thermal and space heating systems analyses were conducted for these residences.

## GOVERNMENT (PROVINCIAL/STATE)

| | |
|---|---|
| ONTARIO MINISTRY OF AGRICULTURE<br>AND FOOD | Horticultural Research Institute<br>Vineland Station, Ont. L0R 2E0<br>(416) 562-4141 |

The research institute is involved in the design and testing of experimental greenhouses and the study of solar energy use in addition to their studies on the production and breeding of fruit, vegetables and other crops needing protection from the environment.

The institute also provides information services to growers in the area.

| | |
|---|---|
| STATE OF ALASKA<br>DIVISION OF ENERGY AND POWER<br>DEVELOPMENT | 338 Denali, 7th Fl. MacKay Bldg.<br>Anchorage, Alaska.<br>U.S.A. 99501<br>(907) 276-0508 |

Contact: Steve Baden

The Alaska Division of Energy and Power Development's primary concern is the development, management and efficient use of Alaska's energy resources and the conservation of energy.

Project inventory:

1. Zeolite Energy Storage. The University of Alaska's Institute of Water Resource was awarded a contract to design, develop and test an energy storage system using the water absorption/desorption properties of naturally occurring Alaskan zeolites. The Division is managing this project.
2. Thermal Shutter Marketing Study. A Fairbanks thermal shutter manufacturer will identify the manufacturing cost elements in insulated shutter production and evaluate potential markets for the Division.

| | |
|---|---|
| U.S. DEPARTMENT OF COMMERCE<br>National Bureau of Standards | Centre for Building Technology<br>National Engineering Lab.<br>Washington, D.C.<br>U.S.A. 20234. |

The aim of the Centre is to increase the usefulness, safety, and economy of buildings through the advancement of building technology and its application to the improvement of building practice.

Under the Centre's Building Thermal Performance Division, research concerning passive solar systems and thermal insulation is conducted.

Some specific research includes:

1. Collector durability and reliability test program standards for solar absorptive coatings
2. Modelling of passive solar buildings
3. Thermal insulation analysis
4. Criteria for building retrofit

# RESEARCH INSTITUTIONS

## UNIVERSITY OF ALBERTA

Dept. of Mechanical Engineering
Edmonton, Alberta. T6G 2G8

Contact: Dr. J.D. Dale
Dr. T.W. Forest

Studies of air infiltration into six full scale houses is being carried out to determine the relative importance of buoyancy-induced stack effect and external wind pressures. The importance of location on the building of a crack or other infiltration opening is being investigated as well as the related problems of moisture transport, condensation and frost formation in houses with low exchange rates.

The University is also engaged in other areas of research. Refer to Sections 2.4, 4.4 and 17.0.

## ATLANTIC WIND TEST SITE

North Cape, P.E.I. C0B 2B0.
(902) 882-2746.

Specializes in testing and evaluating wind energy conversion systems (WECS).

The test site was established by the governments of Canada and P.E.I. as a national laboratory. The facility is presently managed by the Institute of Man and Resources with core operational funding provided by the National Research Council of Canada. The Atlantic Wind Test Site will play an important role in the growth of a strong, successful Canadian wind energy industry by:

1. Providing consumers with information on equipment performance, reliability and expected maintenance costs, so they may invest with confidence in wind systems
2. Providing wind equipment designers and manufacturers with an opportunity to test their systems in a "real world" environment
3. Providing interested WECS purchasers and suppliers with the opportunity to test their wind systems in a severe, coastal environment.

## RESEARCH INSTITUTIONS (continued)

**BRACE RESEARCH INSTITUTE**

MacDonald College, McGill Univ.
1 Stewart Park
Ste. Anne de Bellevue, P.Q.
(514) 457-2000.

Research projects conducted by Brace Research Institute are in the areas of solar, wind, and biomass.

Refer to section 2.4 for more detailed information.

**UNIVERSITY OF BRITISH COLUMBIA**

Dept. of Mechanical Eng.
Vancouver, B.C. V6T 1W5.

Currently involved in energy analysis of residential structure space conditioned by heat pump and furnace using computer simulation.

**CONCORDIA UNIVERSITY**

Centre for Building Studies
1455 de Maisonneuve Blvd. West
Montreal, Quebec. H3G 1M8.
(514) 879-8551.

The Centre for Building Studies produces a list of research projects performed independently and for various external clients through the Government of Industry.

Projects include:

1. Building systems behaviour and design of systems, and components with emphasis on energy efficiency.
2. Compact retrofit building heat storage and solar heaters.
3. Energy consumption, potential-savings and preparation of a survey.
4. Thermal insulation and ultra load capacity of sandwich panel doors.
5. Energy analysis.

## RESEARCH INSTITUTIONS (continued)

UNIVERSITY OF SASKATCHEWAN

Dept. of Mechanical Eng.
Saskatoon, Sask. S7N 0W0.
(306) 343-3101.

Currently involved in research pertaining to:

1. Insulation.
2. Basement floors.
3. Furnaces.
4. Air-to-Air heat exchangers.
5. Window design.
6. Energy efficient housing & greenhouse design.

Funding for these projects received from NSERC, NRC, and EMR, Canada.

SIMON FRASER UNIVERSITY

Energy Research Institute
Burnaby, B.C. V5A 1S6.

Currently researching the improvements in radiant heat flow through fiberglass insulation. A commercial organization is funding the research.

SOLAR APPLICATIONS AND RESEARCH LTD.

3683 West 4th Avenue
Vancouver, B.C. V6R 1P2.
(604) 733-5631

Contact: Roger Bryenton

Refer to Section 5.0 for a detailed description of projects and services offered by the company.

UNIVERSITY OF WINDSOR

Mechanical Engineering Department
Building Energy Group
Windsor, Ontario. N9B 3P4

Contact: Prof. W.G. Colbourne

The university has been involved in research on "Occupant Effects on Residential Energy Consumption." This study has gathered electricity and water consumption records for 5 years on 376 houses in a Windsor subdivision. The houses were almost identical and were built by the same contractor during a five-year period.

cont....

A house-by-house survey was conducted to obtain information on factors related to energy use. These included family size and age, appliances owned, conservation measures practiced if any. Heating loads and base loads were determined from utility records and also calculated based on Ontario Hydro data as well as degree-day calculations. Correlations were determined between energy use and many occupant-related variables. The variables with the most significance were number of people, ownership of washer, dryer, dishwasher and basement heating.

## RESEARCH INSTITUTIONS (United States)

**BROOKHAVEN NATIONAL LABORATORY**

Upton, New York
U.S.A. 11973.
(516) 282-2052.

Presently monitoring and analyzing thermal performance of a "super-insulated" residence in Vermont.

Former studies included:

1. Design, construction, and monitoring the thermal performance of the "Brookhaven House". This house is a hybrid super-insulated passive solar house built in the lab specifically for the North-east region of the U.S.
2. Monitoring the thermal performance of a "convective-loop" residence in Rhode Island and other commercial buildings in New Hampshire.

**UNIVERSITY OF DELAWARE**

Contact: Jamesearl Stockwell

Institute of Energy Conversion
Newark, Delaware
U.S.A. 19711
(302) 453-6200

The institute is a research facility which conducts experiments on thin-film photovoltaic solar cells.

**NASA**

Energy Systems Division
Washington, D.C. U.S.A.

The Energy Systems Division, Office of Aeronautics and Space Technology is responsible for ensuring the effective use of NASA aeronautics and space capabilities in support of national energy needs. NASA scientific and engineering expertise, as well as unique facilities, have proven to be directly applicable to energy research and technology, and significant contributions have been made by NASA toward improving energy technologies for the futures.

Projects include:

1. Solar Heating and Cooling Development Program
2. Wind energy systems
3. Solar thermal electric conversion
4. Solar cell measurement standardization devices and procedures.

SOLAR ENERGY RESEARCH INSTITUTE
1617 Cole Boulevard
Golden, Colorado. U.S.A. 80401
Contact: Ronald Judkoff
(303) 231-1000

The institute conducts research into various areas of energy conservation and energy efficiency strategies.

Projects in the area of cold climate design include:

1. Development and validation of building energy analysis simulations. These simulations are used to predict the effect of various energy conservation and solar options on the entire building performance. The simulations generate design guidelines and rules of thumb.
2. Research on the development of innovative glazing assemblies and thermal storage components.

## RESEARCH INSTITUTIONS (Foreign)

NEW ENERGY DEVELOPMENT ORGANIZATION

Contact: Dr. Takashi Horigome

28th Floor, Sunshine 60 Building
No.1, 1 Higashi
Ikebukuro 3 -chome
Toshima-ku, Tokyo 170. JAPAN
(03) 981-1511

New Energy Development Organization (NEDO) was established to secure a stable energy supply for Japan and reduce Japan's heavy dependence on oil. This goal will be accomplished through research and development of new energy resources which consist mainly of coal, solar, and geothermal energy, as well as developing and exploring for coal and geothermal energy. This organization was established in October of 1980.

## PROFESSIONAL ASSOCIATIONS

**CANADIAN ELECTRICAL ASSOCIATION**

1 Westmount Sq., Ste.580
Montreal, Quebec. H3Z 2P9.
(514) 937-6181.

CEA is a Canadian industrial association which deals with electrical energy research and development.

Types of research and development include:

1. Low rise residential energy audit procedures.
2. A review of research on consumer electricity consumption and conservation.
3. Potential savings available by substitution of standard efficiency Motors with energy efficient motors for Canada.
4. The use of heat pumps for energy conservation in industry, state-of-the-art, and some promising applications.

**AMERICAN SOCIETY OF HEATING REFRIGERATION & AIR-CONDITIONING ENGINEERS**

1791 Tullie Circle, N.E.
Atlanta, Georgia.
U.S.A. 30329
(404) 636-8400

Contact: J. Richard Wright

Current project in this area involves research into the effect of garment design and fabric thickness and weight on the thermal insulation values of clothing. The research is being conducted by the Kansas State University.

Refer also to Sections 2.4 and 14.4 for other areas of research.

## CONSULTING AND ENGINEERING FIRMS

**CAMBRIAN ENGINEERING GROUP LTD.**

2465 Cawthra Road
Mississauga, Ontario. L5A 3P2.
(416) 272-1400

Contact: Bernie Andrzejewski

The firm has engaged in an engineering investigation on by-product hydrogen utilization for Erco Industries. The project was carried out to determine costs, pay-out periods, etc., in the combustion of hydrogen to produce steam in boilers, or drive turbines and engines.

Refer to Sections 3.0, 11.0, 14.1, and 14.4 for a further description of the firm's projects.

**CURRIE, COOPERS AND LYBRAND**

145 King Street West
Toronto, Ontario. M5H 1J8
(416) 366-1921

Contact: Nancy Pinnington

The management consulting firm offers consulting services in a broad range of functional areas, including strategic assessment and planning, organization planning, human resource management, information management, economics, marketing, operations management, and finance. Many of the projects involve study on energy efficiency.

The firm was involved in an energy conservation project with the Ontario Ministry of Energy. The project involved the development of a long-range strategy for delivering a major energy conservation program. The project identified opportunities for energy conservation and renewal, including renewable energy technologies such as synthetic fuels, wind power and passive/active solar energy.

The firm is also involved in other areas of research. Refer to Sections 5.0, 14.4 and 18.0.

## CONSULTING AND ENGINEERING FIRMS (continued)

**DILLON CONSULTING ENGINEERS AND PLANNERS**

47 Sheppard Avenue East
Willowdale, Ontario
(416) 229-4646.

Contact: Mr. Daniel Paquette

The firm is involved with many aspects of energy-efficient design.

Examples of the firm's conservation and renewable energy research includes:

1. Energy conservation studies for 3 Ontario Ministry of Government Service buildings
2. Energy conservation studies for 8 Public Works Canada buildings.

The studies included recommendations pertaining to energy conservation measures for existing public buildings based on a thorough examination of insulation levels, windows, infiltration areas, and heating/cooling systems.

Refer also to Sections 1.0, 2.1, 3.0, 4.1, 8.2, 11.0, 15.0, and 18.0 for more information on the firm's projects.

**SASKMONT ENGINEERING CO. LTD.**

10408 - 124 Street, Suite 201
Edmonton, Alberta.
(403) 482-7351

Contact: Stanley Hayden

Refer to Section 12.0 for a detailed description of the firm's services and projects.

**WARNOCK HERSEY PROFESSIONAL SERVICES LIMITED**

3210 American Drive
Mississauga, Ontario. L4V 1B3.
(416) 678-7820

Contact: M.F. Chell

The company has laboratory testing facilities to evaluate energy efficiencies of building products. Called, the ENvironmental SImulator Chamber, or ENSIC for short, the laboratory has advanced thermal testing equipment for the construction industry. The ENSIC measures energy conservation efficiency of insulations, doors, windows, sidings, coatings and full size composite wall structures and will accept specimens up to 3.28m (10.75 ft.) square.

MANUFACTURING FIRMS (United States)

| | |
|---|---|
| INTERNATIONAL TELEPHONE AND TELEGRAPH CORP. | ITT Fluid Handling Div.<br>8200 N. Austin Avenue<br>Morton Grove, IL. U.S.A. 60053<br>(312) 966-3700. |

Involved in a solar project, the objective of which is:

1. To find out the adaptability for space heating, space cooling, and domestic water service.
2. To develop the proper piping, pumping and control systems.
3. The adaptability of the Fluid Handling Division product line to solar systems.
4. To develop a design manual on the design and development of solar systems.

## EQUIPMENT AND SUPPLY FIRMS

**GENERAL SOLAR INC.**

88F Jamie Avenue
Ottawa, Ontario. K2E 6T6
(613) 993-2730

Contact: Bill Bell

The firm is engaged in the development of a facility for testing solar domestic hot water packages. The testing facility compares different configurations of solar domestic hot-water systems and for determining the effect of changing various system parameters. The project was funded by the National Research Council of Canada under the Solar Energy Program.

## SECTION 7.0

## OCCUPANT AND PSYCHOLOGICAL EFFECTS

## RESEARCH INSTITUTIONS

**UNIVERSITY OF WINDSOR**

Mechanical Engineering Department
Building Energy Group
Windsor, Ontario N9B 3P4

Contact: Prof. W.G. Colbourne

Project inventory:

Occupant Effects on Residential Energy Consumption. This study has gathered electricity and water consumption records for 5 years for 376 houses in a subdivision. The houses were almost identical and were built by the same contractor during a five year period. A house-by-house survey was conducted to obtain information on factors related to energy use. These included family size and age, appliances owned, conservation measures practiced if any. Heating loads and base loads were determined from utility records and also calculated based on Ontario Hydro data as well as degree-day calculations. Correlations were determined between energy use and many occupant related variables. The variables with the most significance were number of people, ownership of washer, dryer, dishwasher and basement heating.

# SECTION 8.0

# RETROFITTING

# SECTION 8.1

# PRODUCTS

GOVERNMENT (PROVINCIAL/STATE)

NEBRASKA ENERGY OFFICE

P.O. Box 95085
Lincoln, Nebraska. U.S.A. 68509.
(402) 471-2867.

The Building Construction Department at the Beatrice Campus of Southeast Community College in Nebraska is under contract to the Nebraska Energy Office to develop and construct a high efficiency masonry fireplace known as the "Russian Fireplace."
The fireplace is a wood-burning furnace based on the concept of exposing more chimney surface to the household's interior.

RESEARCH INSTITUTIONS

CONCORDIA UNIVERSITY

Contact: Prof. K.I. Krakow
Dr. S. Lin

Dept. of Mechanical Engineering
7141 Sherbrooke Street West
Montreal, Quebec
H4B 1R6

The department is involved in development and research of Multiple (solar, air and storage) Source Heat Pump Heating Systems. The project is funded by NSERCC, ASHRAE and NRCC.

## MANUFACTURING FIRMS

### BLACKIE CONCRETE INDUSTRIES

Blackie, Alberta
B0L 0J0

Contact: Keith Laird

The company's Merlon Wall System is a component system made of high strength concrete slabs put together in a dry stack method. Blocks should be constructed in two parallel walls 3 1/2" apart and the void filled with continuous poured-in-place polyurethane foam.

### BUILDING PRODUCTS OF CANADA LTD.

Highway 16A East
Edmonton, Alberta
(403) 466-1131

Contact: Murray Carson

The company manufactures various products used in the construction industry. The products include:

1. Shingles and roofing systems
2. Asphalt - used for ceiling foundations and applying shingles
3. Gypsum papers - used as a facing for plaster board
4. Saturated felt which is a black organic paper saturated with asphalt.
5. Roofing insulation board - used as insulation instead of plywood.

### CANADIAN CELLULOSE INSULATION LTD.

16421 North Railway Road N.W.
Box 19, Site 9, R.R. # 8
Edmonton, Alberta. T5L 4H8
(403) 470-1255

Contact: Alvin Ballachy

The company manufactures a weather shield insulation which has a high R-value, short fibrous, fire retardant, and excellent acoustical qualities.

### CONSERVATHERM PANELS LTD.

608 McLeod Building
Edmonton, Alberta. T5J 0P1
(403) 425-9687

Contact: Harvey Galbraith

The company produces modular insulated construction panels which are used for exterior bearing walls in low rise construction, as fill panels in high rise construction, and as cladding in industrial construction.

MANUFACTURING FIRMS (continued)

DOW CHEMICALS OF CANADA LTD. 10025 Jasper Avenue, Suite 2412
Edmonton, Alberta. T5J 1S6
Contact: Hugh Rooney (403) 428-0442

The firm manufactures styrofoam and roof mate products which are used as additional insulation.

DU-AL BLOCKS (1967) LTD. Sherwood Park
Edmonton, Alberta. T5G 2P4
Contact: August Osis (403) 464-6070

The company manufactures a product called DU-AL Blocks which are form boards used for pouring concrete. These boards are insulated both inside and out.

ENERCON LTD. 2073 Cornwall Street
Regina, Saskatchewan. S4P 2K6
Contact: Dennis Rogoza (306) 585-0022

The company manufactures air-to-air heat exchangers and thermal shutter systems.

ENERSHADE 40 Norwich Street East
Guelph, Ontario. N1H 2G6
(519) 821-8998

The company is involved with the manufacturing of window energy systems. Specifically, the company is addressing itself to the development of insulated window shades. This project is partially funded by CMHC. All future endeavours are restricted to other window energy products.

ENVIRODOME SYSTEMS LTD. 10215 - 178 Street
Edmonton, Alberta. T5S 1M3
Contact: Ed Rusmak (403) 484-9010

The firm manufactures polyurethane foam insulation and various coating systems used to replace tar and gravel roofing.

MANUFACTURING FIRMS (continued)

EQUIBUILT WINDOW SYSTEMS INC.
8241 Davies Road
Edmonton, Alberta. T6E 4N1
Contact: Sylvia Janovac
(403) 468-2756

The firm produces vinyl windows which have a 100% vinyl frame. The windows are usually triple hermatically-sealed units with 1/2" air spaces. These windows are maintenance-free and have a low infiltration factor(no condensation).

FIBERGLAS CANADA LTD.
Hwy. 16E, Sherwood Park, PO Box 595
Edmonton, Alberta
Contact: Don Clark
(403) 467-8851

The firm manufactures fiberglass insulation which is composed mainly of sand, is melted and spun into fibres. The product is available in all thicknesses for residential, office, commercial and industrial use.

FOUR STAR MILLWORK
Grande Prairie, Alberta
(403) 539-3050
Contact: Don Prodaniuk

The firm manufactures triple glazed windows for residential units.

FRESH AIR FIREPLACES OF CANADA
633 Park Street
Regina, Saskatchewan. S4N 5N1
Contact: Lindsay Neilson
(306) 949-0868

The firm manufactures a zero clearance fireplace which brings outside air in through a heat exchange and fans the hot air into the home. This process forces draughts out of the house.

GESCAN LTD.
14325 - 112 Avenue
Edmonton, Alberta. T5H 2V4
Contact: J. Waldner
(403) 454-6551

The company manufactures capacitors which aid in the reduction of power consumption. The capacitors are useful for residential, commercial and light industrial complexes. The company is a division of Canadian General Electric.

## MANUFACTURING FIRMS (continued)

W.B. GRACE AND COMPANY
14810 - 123 Avenue
Edmonton, Alberta. T5L 2Y5
Contact: Bill McDougall
(403) 454-4511

The company produces a loose pouring insulation used primarily for re-insulation called Zonolite insulation. This product is used mainly in low rise residential units. The firm also produces other types of insulation such as Polycel Foam insulation which is a sealant used around windows and other places in the home where there is air infiltration. The firm's Pearlite insulation is used for industrial purposes as a very high temperature insulation.

HARDING INDUSTRIES LTD.
P.O. Box 1582
Saskatoon, Saskatchewan. S7K 3R3
Contact: Maurice Zuk
(306) 652-6026

The firm manufactures a stainless steel fresh air fireplace which introduces cold air from the outside, circulates it around the firebox through a series of air chambers, and emits the air into a room as hot air.

HI THERM MANUFACTURING CO. LTD.
8080A - 36 Street S.E.
Calgary, Alberta. T2C 2J4
Contact: William R. Srigley
(403) 236-0433

The firm manufactures energy saving windows and doors. The Trocal window has multi-chambered solid PVC, is heat and sound insulated, and can be double or triple glazed. The Trocal doors will tilt open for ventilation even when it is locked.

HUNT ROBERT CORPORATION
501 - 45 Street East
Saskatoon, Saskatchewan.
Contact: Kurt Haugred
(306) 244-2800

The firm manufactures a variety of windows which have energy efficient features such as a dual glaze Pella window equivalent in R-value to triple glaze windows.

MANUFACTURING FIRMS (continued)

HYDRO COIL HEATING AND COOLING SYSTEMS

730D - 45 Street West
Saskatoon, Saskatchewan. S7L 5X1
(306) 934-2400

Contact: Cliff Isaacson

The firm manufactures the Hydro Coil Retrofit Kit. The kit contains 1 or 2 heating coils and a circulation pump with a thermostat and control valve plus fittings. This type of kit is used in low rise residential structures.

INSULATION INDUSTRIES

Division of Genstar
7803 35 Street S.E.
Calgary, Alberta. T2E 1V3.
(403) 279-1966

Contact: Tony Walker

The firm manufactures polystyrene insulation which is a white expanded polystyrene beadboard. All building complexes are suitable for the product which can be cut to any dimension.

E.A. KUTRYK INDUSTRIES LTD.

3131 - 57 Avenue S.E.
Calgary, Alberta. T2C 0B2.
(403) 279-2511

Contact: Joe Houtman

The firm manufactures prefabricated steel clad buildings for retail and warehouse purposes. These buildings are lined and insulated, and available with heat and light packages. Each unit has a 2" - R12 Glassfibre insulation sandwiched between the siding and the lining.

L & M WOOD PRODUCTS

Glaslyn, Saskatchewan
(306) 425-3187

Contact: Vic Ellis

The firm manufactures the Therma Log which is installed in the inner or structural wall. The Therma Log provides an equivalent to R32 with 3" of polystyrene insulation.

## MANUFACTURING FIRMS (continued)

LOEWEN MILLWORK
P.O. Box 5027, 2624 Millar Avenue
Saskatoon, Saskatchewan. S7K 4E3
Contact: Phil Beardsworth
(306) 652-2095

The company produces triple glaze windows which are made from B.C. fir and have aluminum weather stripping. The firm also manufactures door units for low rise residential dwellings.

MANVILLE CANADA INC.
9324 - 49 Street
Edmonton, Alberta. T6B 2L7
Contact: Gary Birtwhistle
(403) 465-6182

The firm manufactures fiberglass pipe insulation as well as standard bat, roll or board fiberglass insulation. These products are used in residential, office and warehouse complexes.

McCARTHY & ROBINSON INC.
321 Progress Avenue
Scarborough, Ontario. M1P 2Z7.
(416) 298-1630.

The firm manufactures and sells a rotary air-to-air heat exchanger or regenerator. The firm also designs complete system installations when requested. These systems are used in industrial, mining and other types of plants, as well as apartment and commercial complexes.

MOOSE JAW SASH & DOOR CO. LTD.
P.O. Box 878, 461 Athabasca Street
Moose Jaw, Saskatchewan. S6H 4P5
Contact: Greg Walz
(306) 692-7801

The firm manufactures wood windows which have been created especially for Saskatchewan climates. The windows are designed to insulate with a triple glaze unit that cuts down condensation and double weather stripping to seal in heat.

MANUFACTURING FIRMS (continued)

**PAN - BRICK INC.**
Contact: Jim Sexton

610 Henderson Drive
Regina, Saskatchewan. S4P 3A3
(306) 545-3922

The firm manufactures interlocking brick veneer exterior panels and a non-hardening caulking product. The panels were developed by Dupont of Canada consisting of 5/16" sheeting and 1 1/8" closed cell polyurethane insulation.
The panels have an R-value of 8.7.
The non-hardening caulking product is referred to as Allroc Energy Sealer.

**POLYCO WINDOW MANUFACTURING LTD.**
Contact: Jim Hutt

P.O. Box 430
Weyburn, Saskatchewan. S4H 2K5
(306) 842-3766

The company manufactures P.V.C. windows which are usable in virtually all building structures. The window frames are all poly vinyl chloride, pre-finished and, air and water resistant.

**ROLL-O-THERM DISTRIBUTING AND MANUFACTURING**
Contact: William Halt

107A Avenue C South
Saskatoon, Saskatchewan. S7M 1M9
(306) 382-2771

The firm manufactures window roll shutters and awnings for use in low to high rise residential, office, restaurant, retail and warehouse units.
Developed in Germany, these shutters attach to brick molding and are controllable from the building interior.

**RUDOLPH WINDOWS FACTORY LTD.**
Contact: Raymond Rudolf

4845 - 79 Street, Suite 6
Red Deer, Alberta.
(403) 347-4557

The firm produces wooden windows which can be double or triple glazed for virtually all building types.

## MANUFACTURING FIRMS (continued)

**SUNSCAPE BUILDERS LTD.**

9924 - 152 Street
Edmonton, Alberta. T5P 1X5
(403) 484-5051

Contact: John Larson

The company manufactures a non-structural wooden truss (Larson Truss) that goes on the outside of conventionally-framed low rise buildings to accommodate added insulation.

**TREND WALL INDUSTRIES LTD.**

3611 - 76 Avenue
Edmonton, Alberta.
(403) 469-4034

Contact: Glen Smith

The firm manufactures a heavy gauge steel and stud framing exterior panel used in medium and high rise residential and office units.

The firm is also involved in consulting services (refer to Section 8.2).

**WESTERN CONCORD MANUFACTURING**

14743 - 134 Avenue
Edmonton, Alberta. T5L 4S9
(403) 452-5681

Contact: Roger Adams

The firm produces vapour barriers consisting of polyethylene film which is used in the construction of residential, office and warehouse structures. The firm also produces concrete curing blankets which consist of polyester insulation sewn between 2 surfaces of reinforced plastic. The blankets are used to insulate concrete surfaces while they are curing.

**WILMAR WINDOW INDUSTRIES LTD.**

1630 Alberta Avenue
Saskatoon, Saskatchewan. S7K 1R6
(306) 665-2977

Contact: Paul Mantei

The firm generates wood and prefinished vinyl and aluminum windows which are available in up to triple glazing.

MANUFACTURING FIRMS (continued)

**YUKON INDUSTRIAL INSULATION**
Compartment 39, Site 12, R.R. # 1
Whitehorse, Yukon. Y1A 4Z6
Contact: Jim Ballard
(403) 668-3223

The firm manufactures both insulation and magnetight windows. The low temperature urethane insulation windows have the highest R-value of any board stock insulation on the market (R7.6 per inch) and of multiple use. The magnetight windows have higher insulation values than triple-pane glass and a storm window on the inside of the window.

**ZERO ENERGY PRODUCTS LTD.**
2218 Avenue C North
Saskatoon, Saskatchewan. S7L 6C3
Contact: Bill Dyck
(306) 665-2022

The company is responsible for the production of the R40 wall stud. A machine pre-conditions a 2 x 4 stud to gusset with 5/16" plywood to expand the 2 x 4 to 11", capping it with a 2 x 2 and 5 x 16".

## CONSULTING AND ENGINEERING FIRMS

DILLON CONSULTING ENGINEERS AND PLANNERS

47 Sheppard Ave. E.
Willowdale, Ontario
(416) 229-4646.

Contact: Mr. Daniel Paquette

Dillon Engineers and Planners are involved with many aspects of energy-efficient designs.

Examples include:

1. Sewage Treatment Plant Retrofit, Town of Durham.
2. Greenhouse and Botanical Garden Feasibility Study Metropolitan Toronto Conservatory.

See Sections: 1.0, 2.2, 3.0, 4.1, 6.0, 11.0, 15.0 and 18.0.

SEER CONSULTING LTD.

333 - 25 Street East, Suite 312
Saskatoon, Saskatchewan. S7K 0L4
(306) 665-2797

Contact: Scott Dalgetti

The firm offers consulting services on materials for siding, insulation and/or windows. The firm also provides energy audits for their clients.

## DEVELOPMENT AND CONSTRUCTION COMPANIES

**D & D CONSTRUCTION LTD.**

701 Broadway Avenue, Suite 104
Saskatoon, Saskatchewan. S7N 1B3
(306) 665-2551

Contact: Marcel Denis

The company produces ready-to-move homes. These homes consist of such energy conserving features as triple glaze windows, CES heat exchanger, R60 insulation in the ceilings, acoustical sealant, continuous vapour barrier, forced air system fans, heating system from the water heater, etc.

EQUIPMENT AND SUPPLY FIRMS (United States)

SECO: SYSTEMS FOR ENERGY CONSERVATION

251 Welsh Pool Road
Lionville, Pennsylvania.
U.S.A. 19353
(215) 644-9017.

Contact: J.Paul Jones

The firm manufactures the Thermo-Shade Thermal Barrier. The roll-up barriers can be made to fit almost any type or size of window. Fuel savings are substantial as it prevents 75% of the heat flow through windows.

## PROFESSIONAL ASSOCIATIONS

SASKATCHEWAN ASSOCIATION OF REHABILITATION CENTRES

5000 Idylwyld Drive North
Saskatoon, Saskatchewan. S7L 5Y7
(306) 244-0313

Contact: Wayne Zimmer

The Association manufactures vinyl backed 3" fiberglass Insul Blankets which are used to cover electrical and gas water heaters.

# SECTION 8.2

# DESIGN

## GOVERNMENT (FEDERAL)

ENERGY MINES AND RESOURCES CANADA

Conserv.& Renewable Energy Br.
580 Booth Street
Ottawa, Ontario. K1A 0E4
(613) 995-9447

The Conservation and Renewable Energy Branch of EMR is involved in a retrofit program for Crown-owned buildings. The purpose of this program is to implement capital intensive and cost-effective energy conservation measures to reduce energy consumption in federal government facilities.

PUBLIC WORKS CANADA

201 - 269 Main Street
Winnipeg, Manitoba. R3C 1B2.

The Energy Department of Public Works Canada specializes in energy conservation. The department deals primarily with retrofitting techniques for existing office building owned by the Crown.

## GOVERNMENT (PROVINCIAL/STATE)

### GOVERNMENT OF NEW BRUNSWICK

Box 6000
Fredericton, N.B. E3B 5H1.

The Government of New Brunswick, Energy Secretariat is currently subsidizing a number of small-scale projects dealing with cold climate building design.

The projects include:

1. Passive Solar Retrofit located in Prince William.
2. Super-insulated older home in Fredericton.
3. Three Residential Retrofit projects located in Bathurst, Riverview, and Saint John.
4. Passive/Active Solar House located in Rogersville.
5. Solar Room with Thermal Mass located in Petit-Rocher.
6. Installation of Trombe Wall in Edmundston.

Individuals involved in cold climate design research in the province are:

Bob Clarke
N.B. Housing Corp.
P.O. Box 611
Fredericton, N.B.
E3B 5B2.

Sheila Washburn
Washburn and Gillis Associates
70 York Street
Fredericton, N.B.
E3B 3N5.

Reg Gulliver
N.B. Electric Power Comm.
Director, Energy Management
527 King Street
Fredericton, New Brunswick
E3B 4X1.

Verne Ireton, P.Eng
Mechanical Engineering Dept.
University of New Brunswick
Fredericton, N.B.
E3B 5A3.

Dana Silk
Conservation Council of N.B.
180 Saint John Street
Fredericton, N.B.
E3B 4A9.

## RESEARCH INSTITUTIONS

**ECOLOGY HOUSE**

12 Madison Avenue
Toronto, Ontario. M5R 2S1
(416) 967-0577

Ecology House is a retrofit project implemented by the Pollution Probe Foundation. The house is a super-insulated retrofit structure with passive solar retrofit and solar greenhouse features.

Refer also to section 6.0.

**NEW BRUNSWICK COMMUNITY COLLEGE**

Contact: John F. Hanusiak

Dept. of Continuing Ed.
P.O. Box 2100
Moncton, N.B. E1C 8H9
(506) 384-4397

The college is involved in research on standard retrofitting. The college is currently completing a standard retrofitting project with an active solar heating system for a commercial structure. They are also presently undertaking a building maintenance techniques course which will include energy management systems, etc.

## ARCHITECTURAL FIRMS

**ALLEN-DRERUP-WHITE LTD.**

334 King Street East, Ste. 505
Toronto, Ontario. M5A 1K8
(416) 863-1762

Contact: Lucille Frith

Refer to section 14.1 for a detailed description of the firm's services and projects.

**A.S.K. ARCHITECTS**

P.O. Box 1644
Yellowknife, N.W.T.
(403) 920-2200

Contact: Stewart Kinmond

The firm provides architectural designs of new buildings and offers financial and economic analysis.

Projects include:

1. A private residence with solar heated design
2. Single family dwelling with super insulation, natural ventilation, wood finish rather than drywall.

**BITTORF HOLLAND CHRISTIANSON**

107 Revillon Building,
10221 - 104 Street
Edmonton, Alberta. T5L 1B6
(403) 424-2171

Contact: Johnathon Weizel

Refer to Section 11.0 for detailed description of the firm's services and projects.

**COMMERCIAL DRAFTING SERVICES**

2602 - 8th Street E., Box 1852
Saskatoon, Saskatchewan.
(306) 373-3161

Contact: Al Treppell

The company offers field supervision during construction, energy audits, feasibility studies, and structural, retrofit and air management designs.

Projects include:

1. 4 houses in the Show Case Project
2. 6 demonstration houses in the retrofit project for the Saskatchewan Research Council
3. 30 fully energy-efficient houses in Saskatoon
4. Low-rise apartment block and 62-suite high rise
5. An energy-efficient church.

ARCHITECTURAL FIRMS (continued)

R.G. COOPER ARCHITECT LTD.
Contact: R.G. Cooper

Box 94
La Ronge, Saskatchewan. S0J 1L0
(306) 425-2292

The firm provides architectural consulting service. The firm has recently been involved in the following energy conservation and retrofitting projects:

1. Design of the wood-fired heating system for Apiticusan School in Southend. Funded under the National Energy Conservation Program by the Department of Northern Affair, Ottawa.
2. Design of active air-type collectors and passive solar configuration for a private residence in Saskatoon.

DELINT ARCHITECTS LTD.
Contact: Don Huckerby

100 - 2400 College
Regina, Saskatchewan. S4P 1C8
(306) 522-8577

The firm offers architectural and retrofit design services as well as providing consulting services on design projects. The firm also monitors projects it has designed.

Design projects include such buildings as a recreation centre and pool, a Youth Centre, an Aquatic Centre, the Saskatchewan Power Equipment Centre, and an Agroplex.

FERGUSON, FOLSTAD & FRIGGSTAD ARCH.
Contact: Olbert Friggstad

2233 Avenue C North
Saskatoon, Saskatchewan.
(306) 652-5044

The architectural firm has a full range of architectural designs, and offers consulting and construction supervision skills.

Projects include:

1. Design of a pilot plant for the Saskatchewan Research Council.
2. Design of the Sedco Centre
3. Design of various schools in the province
4. Consultations on design for hotels, a commercial shopping centre, a condominium and hotel complex, a high school, and the Place Riel complex and animal pathology lab at the University of Saskatoon campus.

ARCHITECTURAL FIRMS (continued)

FORRESTER SCOTT BOWERS WALLS

Contact: George Forrester

1120 Morgan
Saskatoon, Sask. S7H 2R7
(306) 374-4455

The firm offers architectural design services and consulting advise.

Projects include:

1. Addition to the Saskatoon City Hall, University of Saskatoon Engineering Building, and the Melfort Union Hospital.
2. Retrofit work on the original University Hospital
3. Saskatoon Convalescent Home.

GERALD L. FORSETH ARCHITECT

Contact: G. Forseth.

208-17 Avenue S.E.
Calgary, Alberta. T2G 1H4
(403) 265-0696.

The firm is primarily involved in solar-oriented and retrofit design.

Projects include:

1. 12 urban-oriented single family dwellings: passive solar design.
2. Light industrial, office, warehouse development.
3. Historic Burns Building: Atrium building retrofit.
4. Sandstone Court House: Retrofit energy and fuel consumption.
5. Teaching design with energy conservation at the University of Calgary.

HILL AND BORGAL, ARCHITECTS AND PLANNERS

58 Elgin Avenue East
Goderich, Ontario. N7A 1K2
(519) 524-6546

The firm specializes in heritage conservation, specifically museum retrofit in cold climate areas. The firm has undertaken the retrofit of several museums located in northern Ontario.

These projects involved the retrofit of insulation and climate control in the museum structures.

ARCHITECTURAL FIRMS (continued)

KEITH SNC

2222 Avenue C North
Saskatoon, Sask. S7L 6C3
(306) 244-0155

Contact: Frank Burry

The firm provides customized design for commercial or industrial use, and heating, ventilating, air-conditioning and building insulation consultation. Projects include warehouses for meat processing industry and Intercon.

**ARCHITECTURAL FIRMS** (United States)

**CROWTHER-KRUSE-MCWILLIAMS**

2830 East Third Avenue
Denver, Colorado.
U.S.A. 80206
(303) 355-2301

Contact: Richard L. Crowthers

Refer to Section 2.1 for a detailed description of the firm's services and projects.

## CONSULTING AND ENGINEERING FIRMS

**ANGUS, BUTLER ENGINEERING (1980) LTD.**
11055 - 107 Street
Edmonton, Alberta. T5H 2Z6
(403) 426-4040

Contact: Percy M. Butler

The firm offers energy-efficient and retrofit designs as well as providing consulting services pertaining to feasibility and economic analysis.

Projects include:

1. Design of a hospital, office buildings, and hotel-office structure.
2. Energy saving system for Safeway store.

**BERTBUILT SOLAR ENGINEERING**
10025 - 113 Street, Suite 201
Edmonton, Alberta. T5K 2K8
(403) 482-1183.

Contact: S.B. Bertles

The firm deals specifically with the retrofit design of low-rise residential energy-efficient units.

A recent project involved improving the energy efficiency of one house. This included the building of a solar collector for domestic water heating.

**CRAWFORD CONSULTING ENGINEERING LTD.**
2232 - 38 Street S.W.
Calgary, Alberta. T3E 3E2
(403) 249-3891

Contact: R.T. Crawford

The firm provides refrigeration design as well as consulting services.

Projects include:

1. Calgary Coliseum
2. Retrofit of refrigeration system to freeze chickens
3. 2 cold storage plants.

CONSULTING AND ENGINEERING FIRMS (continued)

**FRED DEEVES AND SONS LTD.**

6012 Centre Street South
Calgary, Alberta. T2H 0C3
(403) 253-5522

Contact: Royden Romage

The firm offers consulting advise, mechanical and general contracting services and retrofit, mechanical, heating, plumbing, air-conditioning and refrigeration design.

Projects include:

1. Domestic hot water pre-heating system in Calgary Mail Processing Plant
2. Alberta Housing VAV system with energy conservation controls
3. Public Works Canada renovations.

**HASEGAWA ENGINEERING LTD.**

416 Meridian Road S.E.
Calgary, Alberta. T2A 1X2
(403) 285-2412

Contact: Terry Mulliger

The firm provides mechanical and structural architectural designs, consulting analysis, and energy monitors and audits.

Design projects include:

1. Prototype refinery and laboratory for Alberta Government Services.
2. Industrial plant for the Bata Shoe Corporation
3. 5-storey commercial office building

Refer also to Section 11.0 for a description of energy audit and monitoring projects.

**INTERPROVINCIAL ENGINEERING LTD.**

1046 Barrington St., Box 715
Halifax, Nova Scotia. B3J 2T3
(902) 422-1751

The company specializes in drainage and hydrology, land use evaluation and planning, environment management and energy conservation and recovery.

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Projects include:

1. Design of a single well for both supply and recharge in a domestic heat pump application in Nova Scotia.

2. Design of a heat pump for a low temperature (0 degrees Celsius) ocean environment at Halifax, N.S.

3. Preliminary design for the National Research Council.

See Section 8.4 for further projects.

KEEN ENGINEERING LTD.

Contact: Jim Sawers

2060 Broad
Regina, Saskatchewan.
(306) 565-0606

The firm is involved with retrofit design, heating, ventilating, air-conditioning, plumbing, fire protection and automatic controls.

Projects have included:

1. Saskatchewan Telephone Head Office Building
2. Bus Transit Garage
3. Schools and office buildings.

M.C.W. CONSULTANTS LTD.

Contact: John Mercier

1301 - 8 Street S.W., Ste. 105
Calgary, Alberta. T2R 1B7
(403) 245-3705

The consulting firm offers design, consulting, inspection, and production services pertaining to energy efficiency and retrofitting in the development business.

Projects include:

1. Design of the Kelowna Hospital and Royal Bank Building in Edmonton
2. Energy studies for the National Archives Building (Ott), the Manitoba MTS Main Exchange (Winn), Sheraton Hotel (Tor), Canada Building (Winn), and Sam Livingston Building (Cal).
3. Construction on the Hotel Saskatchewan renovation, Calgary Centre, Dover Office building, C.P. Hotel (Calgary airport), Pallisar Hotel renovation (Cal).

## CONSULTING AND ENGINEERING FIRMS (continued)

**MOFFAT ENGINEERING LTD.**

90 Eglinton Avenue East
Toronto, Ontario. M4P 2Y3
(416) 488-5522

Refer to Section 14.1 for a detailed description of the firm's projects and services.

**PASSIVE SOLAR DESIGNS LTD.**

10830 - 107 Avenue, Suite 204
Edmonton, Alberta. T5H 3B7
(403) 426-3857

Contact: John R. Hughes

The firm is involved in retrofit design. They have designed retrofitting for 35 houses with 100-399 meter areas.

Consulting services have included vapour barrier technique, lay out and design, and glazing.

**PEERLESS CONSULTING LTD.**

106 Hillsborough Road
Riverview, New Brunswick.

Contact: Richard Gallant

The firm is a consulting engineering firm specializing in cold climate building design. For further information, contact Mr. Gallant.

**PROFESSIONAL IMPROVERS AND FIELD ENGINEERING LTD.**

2885 - 80 Ave. S.E., Ste.114
Calgary, Alberta. T2C 2E6
(403) 279-2164

Contact: Marvin Pytel

The company offers passive solar conversion and retrofit designs, financial and economic analysis and construction services which includes general contracting and consulting.

Projects include:

1. A conservation house - conversion of an older home to triple size while making it solar efficient
2. Several schools and a residential dwelling
3. Consulted on the Gulf Oil Recovery Plant.

## CONSULTING AND ENGINEERING FIRMS (continued)

**REID CROWTHER AND PARTNERS LTD.**

Contact: Bob Shortreed

7410 Blackfoot Trail S.E.
Box 5600, Postal Station "A"
Calgary, Alberta. T2H 1X9
(403) 253-3301

Contact: Warren Wilson

100 - 2366 Avenue C North
Saskatoon, Sask. S7L 5X5
(306) 244-6113

The firm is involved in electrical, mechanical, structural, industrial, and municipal retrofit design as well as consulting services.

Projects include:

1. Design of the City of Saskatoon Transit offices
2. Design of the Saskatchewan Power Service Centre in Regina
3. Design of low rise office structure at a potash mine
4. Design of several small and mid-sized office buildings
5. 2 major hospitals in the province of Alberta
6. Consultation of the Prince Albert Shopping Plaza and Pulp Mill Industrial Plant.
7. A.G.T. Main office building

**THE RETROFIT SHOP**

Contact: Croft Axsen

928 - 8th Street East
Saskatoon, Sask. S7H 0R8
(306) 665-0122

The company provides energy audits and consulting recommendations. Examples of projects include 300 houses, 4 office buildings and 1 hotel.

**STANLEY-ECONO**

Contact: David Gill

10512 - 169 Street
Edmonton, Alberta. T5P 3X6
(403) 483-4777

Refer to Section 11.0 for a detailed description of the firm's services and projects.

## CONSULTING AND ENGINEERING FIRMS (continued)

**SUN ENERGY ENGINEERING**

26 New Street S.E.
Calgary, Alberta.
T2R 0G9

Contact: Jorg Ostrowski

The firm is involved in retrofit design and consulting analysis. Projects include the retrofit design of a new residence and financial and economic analysis for various school boards.

**SUNERGY SYSTEMS LTD.**

R.R. # 2
Carstairs, Alberta. T0M 0N0
(403) 335-4960

Contact: Michael Kerfoot

The firm provides design, consulting and workshop/seminar services. Their primary interest is in retrofit design, solar-adaptive residential work, air-to-air heat exchange and domestic hot water systems.
Sunergy also consults on houses to be built on existing buildings for energy efficient alternatives as well as providing seminars for Colleges and the Government.

Projects include a community centre and 36 homes.

**SUN RIDGE RESIDENTIAL INC.**

51 Dragan Crescent
Saskatoon, Sask. S7N 5C8

Contact: Keith Hanson

The firm is involved in low energy housing design and construction, and technology transfer.

Projects include the design and construction of numerous low energy houses in Saskatoon as well as the design of many low energy houses throughout North America.

**UNDERWOOD MCLELLAN & ASSOCIATES LTD.**

17007 - 107 Avenue
Edmonton, Alberta. T5S 1G3
(403) 483-7722

Contact: Alan Barnett

The firm provides design services of retrofit, air management and control systems. The company also offers financial, economic analysis and retrofitting consultation in addition to undertaking energy audits for public and private concerns.

cont....

CONSULTING AND ENGINEERING FIRMS (continued)

Examples of design projects include:

1. The Tar Sands project (study of hydrocarbons).
2. A coal mine maintenance building.
3. A 12-storey high-rise senior citizen's building.
4. A 13-storey condominium apartment building
5. Two high-rise office buildings.
6. Most of the major shopping centres in Edmonton with special vaccuum sewage system.

Examples of consulting projects include:

1. Whitehorse swimming pool
2. Warehouses and institutional buildings
3. A hockey arena and curling rinks.

Refer also to Section 11.0 for a description of energy audit projects.

**VINTO ENGINEERING**
10950 - 119 Street
Edmonton, Alberta. T5H 3P2
Contact: Bob Campbell
(403) 452-1800

The firm provides both design and consulting services.

Design services include retrofit studies, energy simulation and analysis, investigation into system alternatives and designs, and cost effective analysis.

Consulting services offered are cost analysis of mechanical heating, air-conditioning, and plumbing.

Design and consulting projects include:

1. Health Science Centre
2. A low-rise residential dwelling
3. An Alberta Housing project consisting of an office structure
4. A 26-storey office high-rise.

**W.J.F. CONSULTING PARTNERSHIP LTD.**
13245 - 146 Street
Edmonton, Alberta. T5L 4S8
Contact: Ed Balchen
(403) 451-3620

The firm is involved in retrofit design and financial and economic analysis.

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Projects include:

1. The installation of insulation in the Cold Lake Arena
2. Consultation of the insulation for Wainwright Recreation Centre and 2 large lift stations.

WAYNE WILKINSON, CONSULTING

7 Ketza Road
Whitehorse, Yukon. Y1A 3V3
(403) 667-4933

Contact: Wayne Wilkinson

The firm designs retrofit construction and air management systems. In addition, the company consults and trains contractors in installing vapour barriers and insulation as well as supervising energy conservation projects under construction.

Projects include:

1. Design of low energy consumption houses for the Yukon Housing Corportation
2. A 36-unit apartment building
3. Consultation of insulation and vapour barrier for the Council of Yukon Indians
4. Consultation concerning alternate wood stoves.

WYLLIE AND UFNAL LIMITED

1 Greensboro Drive
Rexdale, Ontario. M9W 1C8
(416) 248-6105

Contact: Per Furst

The consulting engineering firm deals with energy retrofit design. A recent project involved the addition of insulation to an existing wood frame house. The project was commissioned by the Regional Department of Public Works, Government of N.W.T. Also involved in the project was architect J. P. Gural, 3089 Bathurst Street, Toronto, Ontario. M6A 2A4. (416) 787-5543.

## DEVELOPMENT AND CONSTRUCTION COMPANIES

**BIRCHWOOD BUILDERS LTD.**
Contact: Lindsay Anderson

210 - 12th Avenue East
Regina, Saskatchewan. S4N 6E9
(306) 522-6511

The company offers general contracting and architectural design services. They have completed 7 single family dwellings.

**C & S CONSTRUCTION CO. LTD.**
Contact: Len Mowchenko

Box 1328, 695 High Street West
Moose Jaw, Sask. S6H 4R3
(306) 692-7838

The firm concentrates on retrofit design and general contracting. Projects have included the following:

1. A demonstration residential home in Moose Jaw
2. 2 single family dwellings in Moose Jaw on retrofit design
3. Installation of a solar heating system for swimming pool
4. Assembly of a window with added interior glazing.

**MCGILLIVRAY CONTRACTING AND DESIGN**
Contact: Archie McGillivray

126 - 9th Street East
Saskatoon, Sask. S7N 0A2

The firm provides design services for residential units concerning air management systems and retrofit design. They also offer financial and economic consulting and general contracting services. Projects have included:

1. 16 retrofit designs
2. Design of air management systems in 6 single family dwellings.

**MEDALLION HOMES LTD.**
Contact: Al White

630 - 10 Street East
Saskatoon, Sask. S7H 0G9
(306) 244-0194

The company offers architectural design and general contracting services. Projects have included one energy demonstration home for the HUDAC Parade of Homes in the province with 75% of these energy-efficient features now used in 15 single family dwellings.

## DEVELOPMENT AND CONSTRUCTION COMPANIES (continued)

MODULUS CONSTRUCTION
10830 - 107 Avenue, Suite 204
Edmonton, Alberta. T5H 3B7
Contact: Michael Morse
(403) 420-0579

The firm offers consulting services in the design of custom houses and general contracting services in carpentry. The firm has designed 20 energy-efficient homes.

NU CENTRAL HOMES
Mobile 3 701-45 Street W
Saskatoon, Sask. S7L 5W5
Contact: Stu Harris
(306) 665-6661

The company designs residential homes and offers advise on the cost of energy-efficient houses. Projects have included 10 to 12 single family dwellings.

PLAINSMAN HOMES
3337 - 8th Street East
Saskatoon, Saskatchewan.
Contact: Renus Spear
(306) 373-7777

The firm designs custom homes with energy efficiency and upgrades new homes for further efficiency. The company also provides general contracting, construction supervision, and evaluation reports and analysis. Projects have included:

1. 50-80 single family dwellings per year
2. Supervision of private residences and partial retrofits
3. Analysis of companies such as Saskatoon Power and the South Saskatchewan Regenerative Commission.

SHERLOCK HOMES LTD.
14939 - 112 Avenue
Edmonton, Alberta. T5M 2V6
Contact: Frank Hanlin
(403) 451-6134

The firm offers retrofit designs and general contracting services.

Projects include:

1. A 47-unit townhouse project
2. 18 houses.

## DEVELOPMENT AND CONSTRUCTION COMPANIES (continued)

**SOL-TECH HOUSING (CALGARY) LTD.**

R.R. #1
Dewington, Alberta. T0L 0X0
(403) 938-7945

Contact: Bill Christ

The firm has been involved in retrofit design. Projects have included 1 single family dwelling in HUDAC Parade of Homes and 2 homes in High River.
They have also designed retrofit products such as window quilts, an insulated garage door, and air-to-air exchangers.

Refer also to Section 10.0 for description of air management and control systems services.

**TURNER DEVELOPMENT CORPORATION**

16 Boswell Crescent
Whitehorse, Yukon
(403) 667-6176

Contact: Larry Turner

The firm offers financial and economic consultation, general contracting, heat loss calculations and economic ways to provide lower energy usage in homes.

Projects have included:

1. Design and construction of a low energy demonstration for Yukon Housing.
2. Energy Audit Pilot Study in conjunction with 3 other companies for Canadian Oil Substitution Program.

**WIMPY WESTERN**

3720 - 76th Avenue
Edmonton, Alberta. T5J 2N7
(403) 465-5317/468-6121

Contact: Phil Johnson

Refer to Section 11.0 for a detailed description of projects.

## MANUFACTURING FIRMS

**TREND WALL INDUSTRIES LTD.**

3611 - 76 Avenue
Edmonton, Alberta
(403) 469 4034

Contact: Glen Smith

The firm offers consulting services on design shapes, air leakage, air seals, vapour barriers and retrofit buildings.

Projects include:

1. I.P.L. Building
2. A financial building
3. Twin Atria - Nu West Development
4. Gainsboro Apartments.

The firm is also involved in the manufacture of wall products. Refer to Section 8.1.

# SECTION 8.3

# CONSTRUCTION

## RESEARCH INSTITUTIONS

NEW BRUNSWICK COMMUNITY COLLEGE
Moncton Campus

Department of Continuing Education
P.O. Box 2100
Moncton, New Brunswick. E1C 8H9
(506) 384-4397

Contact: John F. Hanusiak

The college has installed standard retrofitting and an active solar heating system in a retail structure. This structure uses energy conservation and energy efficiency strategies.

Refer also to Section 11.0.

UNIVERSITY OF TORONTO

Department of Civil Engineering,
Toronto, Ontario. M5S 1A4
(416) 978-5053

Contact: J. Timusk

The university is involved in research and development of building products/assemblies for building enclosure. The types of research includes external insulation of basements, drainage characteristics of glass fibre insulating board, mechanical protection for externally applied insulation, etc. Funding for the projects is through grants from private industry, Federal and Provincial Government, and industry associations.

Recent projects completed include:

1. External insulation for HUDAC
2. Insulation retrofit of masonry basements for Ontario Ministry of Housing.
3. Moisture problems in walls and basement report for CMHC.

## CONSULTING AND ENGINEERING FIRMS

ALL WEST ENERGY CONSULTANTS LTD. 646 Henderson Drive
Regina, Saskatchewan. S4N 5X3
Contact: Mr. Steve Brown (306) 949-0350

This firm offers general contracting services. Projects have included about 5 single family dwellings and work on 50-60 buildings for the Saskatchewan warm-up program.

TRITECH CONSULTANTS LTD. 191A Lakeshore Road E.
Oakville, Ontario
Contact: Mr. Donald Halford L6J 1H5

Tritech Consultants are involved in the study of energy conservation methods and the evolution of design details that will succeed in the prevention of energy loss and building deterioration. Specifically, the company deals with roofs, retrofitting and thermographic scans.

Projects include:

1. Sheridan Heights Public School commissioned by the Halton Board of Education. Presently the school is undergoing sealing and tightening. Tritech carried out the original field inspection and then followed up with a thermographic survey. The actual caulking, sealing and insulating is being done by Burlington Caulking.
2. Queen Elizabeth Park High School.
3. 14 Division Police Station, 150 Harrison Street, Toronto, Ontario.
4. Department of Ambulance Services, Building 4330, Dufferin Street, Toronto, Ontario.
5. Thomas Berry Day Care Centre, 3494 Lakeshore Boulevard West, Etobicoke, Ontario.
6. True Davidson Acres Home for the Aged, 200 Dawes Road, Toronto, Ontario.
7. May Robinson Senior Citizen Apartments, 20 and 25 West Lodge Avenue, Toronto, Ontario.
8. Supervision of remedial work required to make the structure watertight, of twelve structures for the Metro Toronto Housing Company Ltd.

## CONSULTING AND ENGINEERING FIRMS (continued)

**WYLLIE & UFNAL LIMITED**

Contact: Mr. Per Furst
Senior Engineer
(Toronto Office)

1 Greensboro Dr.
Rexdale, Ontario
M9W 1C8
(416) 248-6105

156 MacLaren St
Ottawa, Ontario
K2P 0K9
(613) 232-1107

111 Heritage Road #203
P.O. Box 961
Chatham, Ontario
N7M 5L3 (519) 354-4426

Wyllie & Ufnal Ltd. are consulting engineers who deal with structural concerns.

An energy retrofit project involving addition of insulation to existing wood frame housing in Pangnirtung, Baffin Island. The insulation was added to the outside surfaces of the buildings. The project was commissioned by the Regional Department of Public Works, Government of the Northwest Territories, and is still under construction.

Refer also to Section 8.2.

## DEVELOPMENT AND CONSTRUCTION COMPANIES

LIBERTY HOMES
2735 Preston Avenue
Saskatoon, Saskatchewan. S7J 2T7
Contact: Randy Aspinal
(306) 374-1313

This company provides general contracting services. They have constructed 2 energy-efficient homes.

MARLO HOMES LTD.
15001 - 112th Avenue
Edmonton, Alberta. T5M 2V6
Contact: George Frieser
(403) 451-3333

The company offers general contracting services. The firm has constructed 150 single family dwellings. All dwellings have been upgraded for air tightness and insulation.

OPTIMUM HOMES
336 - 5th Avenue North, Suite 301
Saskatoon, Saskatchewan. S7K 2P4
Contact: Brian Dyck
(306) 244-3636

Services offered by the firm include design services on new construction, consulting services to determine the possibility of energy changes and to introduce the principals of energy efficiency, and construction services.

Projects have included 6 housing units, a 32-unit condominium, several apartment units and commercial/retail projects.

SHURMAN'S CONSTRUCTION CO. LTD.
Box 7527, 127 Avenue D North
Saskatoon, Saskatchewan. S7K 4L4
Contact: Lee Shurman
(306) 244-3886

The company provides general contracting services. Projects completed by the company include a home built for the Energy Showcase and 2 completely energy-efficient dwellings.

## DEVELOPMENT AND CONSTRUCTION COMPANIES (continued)

VICTORY HOMES LTD.
350 - 103rd Street
Saskatoon, Saskatchewan. S7N 1Z1
Contact: Keith Hanson
(306) 374-4959

The firm offers complete architectural and full engineering design services. Examples of projects include 60 single family dwellings and 24 multi-family dwellings.

The firm also offers financial/economic analysis and preliminary development services for projects.

N.H.F. Engineering Ltd. provides the engineering consulting services on the firm's projects.

ZERO ENERGY CONSTRUCTION
2218 Avenue C North
Saskatoon, Saskatchewan. S7L 6C3
Contact: Bill Dyck
(306) 665-2022

The firm offers general contracting services. They have constructed 10 single family dwellings throughout the province. All were pilot projects.

## EQUIPMENT AND SUPPLY FIRMS

**POLAR HEATING LTD.**
4148 - 76 Avenue
Edmonton, Alberta. T6B 2P1
(403) 484-5051/465-0786
Contact: Lloyd Raynard

The firm installs air-to-air heat exchangers in buildings. These have been installed in 6-8 single family dwellings.

# SECTION 8.4

# RESEARCH

## GOVERNMENT (PROVINCIAL/STATE)

PROVINCE OF BRITISH COLUMBIA
MINISTRY OF MUNICIPAL AFFAIRS

Contact: Gary Paget

Policy and Research Branch
747 Fort Street
Victoria, British Columbia
V8W 3E1

The Ministry was responsible for the planning of the new community of Tumbler Ridge (a coal town) currently under construction in the northeast region of the Province. Energy considerations were built into the planning and a study that will identify the cost effectiveness of new housing which contains progressively more expensive retrofits will be completed. Recommendation will be made on how to design and build houses with energy conserving features and how to monitor their performance. The work is being undertaken by David Eyre of the Saskatchewan Research Council and will be managed by Jack Wadsworth, CMHC, Ottawa.

Another study will identify the costs and benefits of incorporating energy conserving features over and above those used in the first phase subdivisions of Tumbler Ridge. The work will be done by Pacific Planning Collaborative in Vancouver and will be managed by Gary Hiscox, CMHC, Vancouver.

An examination of financing alternatives in order to incorporate energy-efficient housing will be done so that recommendations on the method of financing the incremental costs of energy conserving features in housing over a base example can be made.

For other studies see Sections 1.0 and 3.0.

NORTHWEST TERRITORIES
GOVERNMENT SERVICES

Contact: J.A. Severn

Energy Conservation Division
Government of the N.W.T.
Yellowknife, N.W.T.
X1A 2L9

This department is sponsoring a Canada/Northwest Territories Conservation and Renewable Energy Demonstration Program.

cont....

Project inventory:

Arctic Residential Retrofit. The purpose was to test the effectiveness of various energy conservation and alternate energy methods in an arctic climate through retrofit of an existing house. A 2kW Dunlite wind generator was integrated into the electrical system to supplement home electrical supply. Solar collectors mounted on the roof of the building help heat domestic hot water. Conservation includes, added insulation, caulking, weatherstripping and vapour barriers, triple thermopane windows and shutters, clothes dryer heat recovery, fluorescent lights and improved furnace efficiency.

The project will supply information concerning the effectiveness of the various methods used and the potential for such houses in the north. A data synthesis for energy comparison and cost evaluation will be available at yearly intervals from the Dept. of Public Works, Frobisher Bay, N.W.T.

## RESEARCH INSTITUTIONS (Foreign)

**BUILDING RESEARCH ESTABLISHMENT**

Contact: Dr. D.J. Fisk
Head of Mech. and Elec.
Engineering Division

Department of the Environment
Building Research Station
Garston, Watford
England WD2 7JR
(0927 3) 74040 Ext. 7151

The majority of the BRE Research Program supports the Dept. of the Environment in its policy responsibilities for housing, energy conservation and environmental protection.

Project inventory:

Heat pump performance. Objectives of the project are:

1. To provide design criteria and standards for the selection of heat pumps for domestic dwellings.
2. To provide guidance on the most effective means of integrating the heat pump into the domestic dwelling.
3. To provide an evaluation of heat pump technology covering its contribution to energy conservation in housing, its impact on its local environment, and its cost implications for housing construction and refurbishment.

Trials will continue of the use of a single heat pump for group heating at the low energy housing site, Basildon. Guidance for estimation of housing heat load and energy consumption appropriate to selection of heat pump will be prepared on the basis of proposed British Standard heat pump performance test. The assessment of local environmental impact of heat source, including ambiant air, loft space ground and ground water, and the implication for dwelling performance and construction will be completed.

For other projects refer to Sections 2.4, 3.0, 5.0, 10.0, 11.0, and 17.0.

## CONSULTING AND ENGINEERING FIRMS

**IBI GROUP**

156 Front Street West, 6th Floor
Toronto, Ontario. M5J 2L6
(416) 596-1930

Contact: Harold J. Katzin

Projects in this area include:

1. Greenhouse Retrofit Study for Agriculture Canada.
2. Residential Solar Retrofit in Canada - a study carried out for Energy Mines and Resources Canada consisting of a cross-Canada survey of solar retrofit applications.

Refer also to Sections 1.0, 2.1, 2.2, 11.0, 14.3 and 14.4.

**INTERPROVINCIAL ENGINEERING LTD.**

1046 Barrington Street
P.O. Box 715
Halifax, Nova Scotia. B3J 2T3
(902) 422-1751

The company specializes in drainage and hydrology, land use evaluation and planning, environmental management and energy recovery and conservation.

Projects include:

1. Monitoring of a Groundwater Heat Pump Installation. Base data are acquired and the performance of a domestic ground water heat pump operating as a sole source of heating in a 2,500 sq.ft. house will be analyzed. The project is located in Pictou County, Nova Scotia and will be completed for the NRC by November 1983.

1. Inventory of Water Source Heat Pumps in Nova Scotia. This project involves the evaluation of domestic heat pump units in Nova Scotia and makes recommendations for future development. Completed for the Nova Scotia Department of Mines and Energy.

# SECTION 9.0

# EARTH SHELTER HOUSING

**UNIVERSITY OF MINNESOTA**
Underground Space Centre

28 Appleby Hall, 128 Pleasant St.SE
Minneapolis, Minnesota.
U.S.A. 55455
(612) 376-5341

Contact: Dr. Raymond Sterling
Dr. Charles Fairhurst
Dr. Thomas Bligh

Various research projects have been conducted by the Underground Space Centre of the University of Minnesota. They are as follows:

1. Earth-sheltered energy-independent residential study (1977-78). The study investigated the architectural design of earth-sheltered, single family dwellings.
2. Earth-sheltered multi-residential study (1980-81) which investigated the architectural design of energy-efficient multiple-unit earth-sheltered residences.
3. Energy performance monitoring project (1979-present). This study involves seven earth-sheltered houses in Minnesota which are being monitored for energy performance.
4. Study on the potential for underground industrial and storage facilities in Minnesota (1978). The study is focused on oil storage, sewage treatment, and commercial applications.
5. Study of technical design of single-family earth-sheltered housing (1981). This study has developed a design guide for the planning, design and construction of earth-sheltered housing.
6. Planning study of underground urban development (1981-82) has produced general guidelines for development of sub-surface space in cities, and a case study of the potential for such development in Minneapolis.

All research projects have been funded by government and private agencies.

## ARCHITECTURAL FIRMS

**JOHAN DE VILLIERS**

R.R.#3, Sherbrooke Street West
Peterborough, Ontario. K9J 6X4

Contact: J. De Villiers

Refer to Section 14.1 for a detailed description of projects.

**ALAN GARDNER ARCHITECT**

2402 - 10th Avenue S.W.
Calgary, Alberta. T3C 0K6
(403) 246-1444

Contact: Alan Gardner

This architect is engaged in the design of buildings for energy efficiency, architectural consulting, and financial and economic analysis.

Projects have included an earth-sheltered residence and 10 houses utilizing a 'greenhouse' concept.

**G.M. GERRIE**

45 Arkledun Avenue, Apt. 702
Hamilton, Ontario. L8N 2H6
(416) 522-5645.

Examples of the architect's earth-sheltered housing design include:

1. A one-storey earth-sheltered (3 sides and roof) Ambulance Service Facility located on Millgrove Sideroad at Hwy. #5 west of Waterdown. The facility is being monitored for temperature gradients in the ground-to-air transfer medium and adjacent soil. Project completed April 1980.
2. A one-storey earth sheltered (3 walls and roof) Farm Cheese Manufacturing Plant located in Shigawake, Quebec. Completed in June 1982.

Mr. Gerrie is also involved in solar design. See Section 2.1 for a detailed description.

## ARCHITECTURAL FIRMS (continued)

ROBERT S. YAMAMOTO ARCHITECTS
2321 Fairview Street, Suite 200
Burlington, Ontario. L7R 2E3
(416) 637-2313

Contact: Robert Yamamoto

The firm has researched energy-efficient, earth-sheltered building design. They offer consulting services to assist interested clients in avoiding some of the major pitfalls encountered in such designs.
Potential project for an earth-sheltered museum has been post-poned due to insufficient funds.

## ARCHITECTURAL FIRMS (United States)

CLARK & WALTER

513 S. Union
Traverse City, Mi. U.S.A. 49684.
(616) 946-3627.

Actively involved in earth shelter and passive solar designs. The firm has designed numerous earth shelter residences.

For a detailed description of the projects, please contact the firm.

EARTH SHELTER CORPORATION OF AMERICA

Contact: Bob Krohn

Route 2, Box 97 B
Berlin, Wisconsin.
U.S.A. 54923
(414) 361-2266

The corporation designs and builds earth-bermed and partial underground homes containing optional passive/active solar features.
All of the homes integrate mass: concrete, masonry, water and earth, for thermal storage. Other alternatives include passive thermosyphoning heating and hot water system, glazing and landscaping elements to enhance passive solar design.

CHARLES HARTLING ARCHITECT

Contact: Charles Hartling

1300 Canyon
Boulder, Colorado. U.S.A.
(303) 442-1342

Refer to Section 2.1 for a detailed description of the firm's services and projects.

JOINT VENTURE ARCHITECTS

Contact: Phillip J. Tabb

1140 Detroit Street
Denver, Colorado. U.S.A. 80206
(303) 333-8997

Refer to Section 2.1 for a detailed description of the firm's services and projects.

SETTER, LEACH AND LINDSTROM INC.
11011 Nicollet Mall
Minneapolis, Minnesota.
U.S.A. 55403

Contact: Edward Frenette

The firm is under contract to the U.S. Department of the Navy to produce a text establishing design guidelines applicable to earth-sheltered non-residential Navy buildings. The project was initiated in 1980 and will be completed by end of 1982.

## CONSULTING AND ENGINEERING FIRMS

**BARRY ROBEY DESIGN UNIT**

200, 121-15th Avenue
Calgary, Alberta. T2G 1G1
(403) 265-1950

The firm is involved in the design, consulting and teaching aspects of energy conservation planning.

Projects include:

1. A large 5,000 sq.ft. house.
2. One active solar-assisted house.
3. Two houses partially earth-bermed.
4. Instructed a course on "Designing and Building Your Own House" for the Calgary School Board.

## CONSULTING AND ENGINEERING FIRMS (United States)

ENVIRONMENTAL CONSULTING SERVICE
Walnut Street
Boulder, Colorado. U.S.A. 80302
Contact: Dr. Jan Kreider
(303) 4476-2218

Refer to Section 2.1 for a detailed description of the consulting engineer's projects.

WAYNE C. LARSON
613 Fourth Street
White Bear, Minn. U.S.A. 55110
Contact: Wayne Larson
(612) 429-8363

This structural engineering firm specializes in the area of earth sheltered housing design. They have designed structural systems for more than half of the earth sheltered homes in the state of Minnesota. The firm are experts in the use of new energy conserving construction materials such as wood foundations, insulated tilt-up panels and sandwich panels.

The firm also provides consulting services. One example is a study they conducted for Kraft Foods concerning an earth sheltered storage facility in St. Cloud, Minnesota.

## SECTION 10.0

# HEATING, VENTILATION AND AIR-CONDITIONING

## GOVERNMENT (FEDERAL)

NATIONAL RESEARCH COUNCIL

Division of Building Research
Montreal Road
Ottawa, Ontario. K1A 0R6

Contact: Joyce Waudby-Smith

The Division of Building Research produces a list of research projects which were carried on during 1981-1982.

In the area of building research, the Division has studied ventilation, air quality, and air movement in buildings.

Please refer to Sections 2.1, 4.1, 5.0, 6.0, 14.1, 14.2 and 16.0 for a complete list of projects.

## GOVERNMENT (PROVINCIAL/STATE)

NORTHWEST TERRITORIES
GOVERNMENT SERVICES

Contact: J.A. Severn

Energy Conservation Division
Government of the N.W.T.
Yellowknife, N.W.T.
X7L 2A9

This department is sponsoring a Canada/Northwest Territories project for heating systems design. One project involves designing a new heating system for the Mac la Martre School by reclaiming heat from a diesel generating plant.

For other projects refer to Sections 3.0, 5.0, 8.4, 10.0, 14.1 and 16.0.

## RESEARCH INSTITUTIONS

**UNIVERSITY OF WATERLOO**
Contact: Prof. T. Hollands

Department of Mechanical Eng.
Waterloo, Ontario. N2L 3G1
(519) 885-1211

The National Research Council of Canada sponsored the Department of Mechanical Engineering to conduct a project on the potential of natural cooling in Canada. The project was funded under the Solar Energy Program. Under investigation were: a review of the state-of-the-art in passive and low-energy cooling systems, and an assessment of which systems may be effectively employed in Canada.

## RESEARCH INSTITUTIONS (United States)

BRADLEY UNIVERSITY

Dept. of Mechanical Engineering
Peoria, Illinois. U.S.A. 61625
(309) 676-7611

Contact: Prof. Y.B. Safdari

The department of Mechanical Engineering under Professor Safdari, is currently researching heating systems and energy efficiency in design and solar collection.

A recent project included the design of a heating system for Morgan Hall using the DOE-2A computer program.

For projects in other areas see Sections 2.4 and 14.1.

## RESEARCH INSTITUTIONS (Foreign)

**BUILDING RESEARCH ESTABLISHMENT**

Department of the Environment
Building Research Station
Garston, Watford
England, WD2 7JR
(0927 3) 74040 ext. 7151

Contact: Dr. D.J. Fisk
Head of Mech. and Elec.
Engineering Division

The majority of the BRE Research Program supports the Dept. of the Environment in its policy responsibilities for housing, energy conservation and environmental protection.

Project inventory:

Heat Recovery. The objectives of this project were to develop and evaluate economically and technically, heat recovery procedures and methods of specification in order to aid the application of these techniques to existing and new buildings. Air-to-air heat exchangers have been acquired from overseas, a low-cost heat exchanger has been developed via a contract with the National Engineering Laboratory, and a rig for use in assessing and comparing performance is being designed and constructed. A heat pump-based waste-water heat recovery system has been developed and initial measurements of performance carried out. These measurements will be completed and used to validate the computer-based model of performance.

Refer also to Sections 2.4, 3.0, 5.0, 8.4, 11.0, and 17.0.

## ARCHITECTURAL FIRMS

CAIRENIUS MARKUS ARCHITECT

195 Kennedy Road South, Suite 309
Brampton, Ontario. L6W 3H2
(416) 453-4325

The firm has designed an electric space heater that is energy and cost efficient.

TERRY HARTWIG ARCHTECT LTD.

Contact: Terry Hartwig

10944 - 120 Street
Edmonton, Alberta. T5H 3P7
(403) 451-5690

The firm offers design services to improve heat design in buildings and supervision of construction. They have improved the heat design in 800 town house units.

KEITH SNC

Contact: Frank Burry

2222 Avenue C North
Saskatoon, Saskatchewan. S7L 6C3
(306) 244-0155

Refer to Section 8.2 for a detailed description of the projects and services offered by the firm.

## CONSULTING AND ENGINEERING FIRMS

ADEPT CONSULTING LTD.
706-7th Avenue S.W., Suite 005
Calgary, Alberta. T2P 0Z1
Contact: Rick Godderis
(403) 262-4147

The firm provides consulting services on mechanically-engineered, heating, and air-conditioning systems. The firm also conducts thermography studies on building envelopes and energy audits. Projects include the Red Deer Hospital, a 5-storey office building and several residential structures.

ANGUS BUTLER ENGINEERING LTD.
1112 Morgan
Saskatoon, Saskatchewan.
Contact: Jerry Helfrech
(306) 477-1113

The firm offers design and consulting services on heating, ventilation, air-conditioning, lighting, power and motor control systems. Types of projects include 2 high-rise buildings, 2 houses, a hospital and a welding shop.

BRIGGS AND ASSOCIATES LTD.
2333 Albert Street
Regina, Saskatchewan. S4P 2V8
(306) 352-5638

The firm is composed of mechanical engineers specializing in heating, ventilation and air-conditioning designs. All materials and products used in the designs are commercially available.

Projects include the Lac Laronge office building and 2 schools with live-in accommodations.

Refer to Section 11.0 also.

DANIELS ENGINEERING LTD.
2602 - 8th Street East
Saskatoon, Saskatchewan.
Contact: John Daniels
(306) 477-0678

The firm offers design services on heating and ventilation systems, and refrigeration units. The firm also offers financial and feasibility analysis on a small scale. Types of projects have included 3 retail outlets, an office building and an institutional building.

## CONSULTING AND ENGINEERING FIRMS (continued)

**HENDERSON J.D. ENGINEERING LTD.**

205 - 11 Fairway Drive
Edmonton, Alberta. T6J 2S6
(403) 436-2111

Contact: Jim Henderson

610 - 70 Avenue S.E., Suite 202
Calgary, Alberta. T2H 2J6
(403) 252-9935

Contact: Bruno Ratzlaff

The firm designs mechanical, heating, air-conditioning, refirgeration, and piping components as well as offering consulting services in these areas.

Projects include:

1. Heat reclamation for a foundry.
2. Heat recovery for schools in Edmonton, Medicine Hat and Ranchland School in Calgary.
3. Solar heated home in Montana.
4. Report of energy use and possible conservation methods submitted to the Government on Fort McMurray and Whitehorse airports.
5. Energy audit on Southridge School.

**HOOKER ENGINEERING LTD.**

12-2307 14th Street
Regina, Saskatchewan
(306) 525-9815

The firm is involved in the design and construction of solar air and water heating systems.

Other projects are listed in Section 2.1.

**JENSEN ENGINEERING LTD.**

Professional Building
Olds, Alberta. T0M 1P0
(403) 556-8755

Contact: N.E. Jensen

The firm offers design services for heating, ventilation, and air-conditioning systems. They have designed systems for livestock barns and residential homes. The firm also provides consulting services on energy use and energy audits with farm groups. They have serviced the Canadian Federation of Agriculture, Unifarm United Farmers of Alberta and the Federated Co-Op.

## CONSULTING AND ENGINEERING FIRMS (continued)

KEEN ENGINEERING LTD.
2060 Broad
Regina, Saskatchewan.
Contact: Jim Sawers
(306) 565-0606

239 - 10 Avenue S.E., Suite 203
Calgary Alberta. T2G 0V9
Contact: Ken Junk
(403) 233-9044

10235 - 124 Street, Suite 103
Edmonton, Alberta. T5N 1P9
Contact: Harry Hleck
(403) 482-6921

Refer to Section 8.2 for a detailed description of the firm's projects and services.

KOSTENUK ASSOCIATES LTD.
2346 - 2nd Avenue N.W.
Calgary, Alberta. T2N 0H4
Contact: T.W. Kostenuk
(403) 283-8271

The firm offers design services on heating, ventilation and air-conditioning systems as well as financial/economic analyses and feasibility studies.

ROEMER AND ASSOCIATES
5807 - 104 Street
Edmonton, Alberta. T5H 0V3
Contact: N.R. Elliot
(403) 434-1118

The firm offers design services on heating, ventilation, and air-conditioning and plumbing systems. The firm will also determine feasibility and consult on mechanical building design. Projects include a motor inn and an office building.

SED SYSTEMS LTD.
2345 Avenue C North,
P.O. Box 1464
Saskatoon, Saskatchewan. S7K 3P7
Contact: J.D. O'Shea
(306) 244-0976

The firm offers consulting services on control systems for heating, ventilating and air-conditioning systems that may be in existence or are planning to be installed. Projects have included all buildings on the University of Regina campus, University Hospital and building systems analyses.

## CONSULTING AND ENGINEERING FIRMS (continued)

**SOL-TECH HOUSING (CALGARY) LTD.**

Contact: Bill Christ

R.R. #1
Dewington, Alberta. T0L 0X0
(403) 938-7945

The firm specializes in complete engineering and architectural services on air management systems and retrofit design. They also provide consulting services primarily related to energy-efficient heating, feasibility studies and financial and economic analyses.

Refer to Section 8.2 for a list of projects.

**SUN WOODS ENGINEERING LTD.**

Contact: Jim Bassett

P.O. Box 100
Christopher Lake, Saskatchewan
S0J 0N0
(306) 982-4315

Refer to Section 2.1 for a detailed description of projects and services offered by the firm.

**WASNEA ALLEN AND PARTNERS LTD.**

Contact: Allen D. Wasnea

10424 - 123 Street, Suite 105
Edmonton, Alberta. T5N 1N7
(403) 451-2531

The firm offers design services on heating and air-conditioning systems for commercial buildings. They will also determine energy conservation measures, and do financial analyses. Projects include residential, office, recreational and retail structures.

**YEWCHUK ENGINEERING (1979) LTD.**

Contact: Stephen Yewchuk

P.O. Box 5366, Station E
10664 - 156 Street, Suite 206
Edmonton, Alberta. T5P 4C9
(403) 483-0164

The firm offers air-conditioning and ventilating design services in addition to computer analysis on the effectiveness of conservation measures, air pollution design systems, building and site services design, feasibility studies and energy audits. Projects include institutional buildings, office and industrial structures.

## CONSULTING AND ENGINEERING FIRMS (United States)

**THE RMH GROUP INC.**

405 Urban Street, Suite 401
Denver, Colorado. U.S.A. 80228
(303) 988-7720

Contact: Dr. Gary L. Porter

Refer to Section 17.0 for a detailed description of projects and future projects performed by the firm.

## MANUFACTURING FIRMS

AIR CHANGER

334 King Street East
Toronto, Ontario. M5A 1K8
(416) 863-1792

Contact: Lucille Frith

The firm specializes in heat recovery ventilation equipment. They design and manufacture air-to-air heat exchangers. These are installed across Canada in areas that include Whitehorse, Frobisher Bay and some U.S. towns. Future products on-line will involve the manufacture of agricultural air-to-air heat exchangers for farrow to finish, poultry and cow-calf operations.

BLACKHAWK INDUSTRIES INC.

607 Park Street
Regina, Saskatchewan. S4N 5N1
(306) 924-1551

Contact: Tracy Solie

The firm is the exclusive manufacturer of Blackhawk Heat Recovery Systems (formerly the Enercon air-to-air heat exchanger) for both residential and agricultural uses. While the major product line is the heat exchanger, they will be undertaking research and development into more energy conservation devices (thermal shutters, agricultural implements etc.).

C.E.S. CONSERVATION ENERGY SYSTEMS INCORPORATED

800 Spadina Crescent E., Box 8280
Saskatoon, Saskatchewan. SK7 6C6
(306) 665-6030

Contact: Rick Olmstead

The firm manufactures an air-to-air heat exchanger that provides 250 CFM free air flow (118 litres/second). This product is used in residential, commercial, retail and light industrial building sectors.

CLIMATE MASTER

6130 - 97 Street
Edmonton, Alberta
(403) 436-5924

Contact: Al Solie

The company produces large and small gas-fired heating furnaces and mechanically refrigerated systems for air-conditioning. These types of products are used in low to high rise office and residential structures, retail buildings, and warehouse and light industrial structures.

## MANUFACTURING FIRMS (continued)

CROMARTIE HOT WATER HEATING SYSTEMS
1014 Boychuk Drive
Saskatoon, Saskatchewan. S7H 4Z1
(306) 373-2803

Contact: John Cromartie

The company manufactures the Cromartie Forced-Air Hot Water Heating System. This product is used in the residential, retail, commercial and light industrial building sectors.

ENERCON INDUSTRIES LTD.
355 - 7th Avenue
Regina, Saskatchewan. S4N 5B8
(306) 585-0022

Contact: David Lange

The firm manufactures an air-to-air heat exchanger. This type of product is used in the residential, commercial and retail and light industrial building sectors.

ESD INDUSTRIES INC.
Division of Air Tex Industries
1146 Westport Crescent, Unit 6
Calgary, Alberta. T2G 4C8
(403) 287-2590

Contact: Clint Stewart

The firm manufactures conventional heating and air-conditioning equipment. This equipment recovers heat from exhaust air and transfers it into incoming air with associated controls. This type of equipment is used in low and high rise residential structures, office buildings, retail and light industrial structures.

## MANUFACTURING FIRMS (continued)

**HYDRO COIL HEATING/COOLING SYSTEMS**
Contact: Cliff Isaacson

730D - 45 Street W.
Saskatoon, Saskatchewan. S7L 5X1
(306) 934-2400

The company manufactures the Hydro Coil Heating System. This product is designed for efficient hot water heating combined with the convenience of forced air. The product can be used in all building sectors.

**KIRKS SHEET METAL PRODUCTS**
Contact: Vernon Wiebe

Box 222, 118 - 3 Avenue N.
Three Hills, Alberta. TOM 2A0
(403) 443-5911

The firm manufactures Solar-fired furnaces which use lignite and sub-bituminous coal. This product is used primarily in low rise residential buildings.

**LIN-T MANUFACTURING/ DISTRIBUTING LTD.**
Contact: Bob Laing

12017 - 160 Street
Edmonton, Alberta. T5V 1G7
(403) 452-8097 or 454-6607

The company manufactures the Space Pak Heat Cool System which is 100 per cent adaptive to passive solar heating and cooling systems. The product is used in residential, light industrial and retail building sectors.

**SHELDONS MANUFACTURING LTD.**
Contact: Dick Middlebrough

P.O. Box 230
Nisku, Alberta. TOC 2G0
(403) 955-2800

The firm manufactures the Sheldon Fan. The fan unit has a cooling and heating system. It is designed to handle up to 3.2 million cubic feet of fresh air/minute. The unit can be used in all types of building sectors.

**ZERO ENERGY PRODUCTS LTD.**
Contact: Bill Dyck

2218 Avenue C North
Saskatoon, Saskatchewan. S7L 6C3
(306) 665-2022

The company manufactures an air-to-air heat exchanger that is capable of recovering up to 84% of total heat. This product is used in low-rise residential building sectors.

## MANUFACTURING FIRMS (United States)

RESEARCH PRODUCTS CORPORATION
Solar Division
Contact: Brad Neilson

1015 East Washington Avenue
Madison, Wisconsin. U.S.A.
53701

This firm provides the following services:

1. Installs solar air-to-air heating systems for residential space heating.
2. Services hot water, air make-up and industrial process heat.

These systems were installed throughout the states of Wisconsin, Ohio, and North Dakota. In all cases, the installations were done on an individual bid basis with no government funds allocated.

SURGEONICS LIMITED

155 Kisco Avenue
Mt. Kisco, New York.
U.S.A. 10549
(914) 241-3203

The firm designs heating system controls for energy conserving structures. One of the firm's recent projects was the design of a micro-computer-based boiler water temperature modulation and circulation control for residential hydronic heating systems. The company is planning on designing the following products in the future: A warm air heating system controller and a steam air heating system controller.

## EQUIPMENT AND SUPPLY FIRMS

**HEADFORD ELECTRIC LTD.**
Contact: Norman Headford

1265 Osler
Regina, Saskatchewan. S4R 1W4
(306) 569-9553

The company offers design and handling services on computerized energy equipment and control devices for heating, cooling and lighting. The firm also designs air flows and performs energy audits.

**SIMPLEX INTERNATIONAL TIME EQUIPMENT LIMITED**
Contact: Mike Graham

4141 - 98th Street
Edmonton, Alberta. T6E 5N5
(403) 463-4940

The firm designs and supplies computer-controlled lighting and fan systems for institutional and commercial structures.

## EQUIPMENT AND SUPPLY FIRMS (United States)

**RESEARCH PRODUCTS CORPORATION**

1015 East Washington Avenue
Madison, Wisconsin. U.S.A.
1 - (800) 356-9652

The firm designs, develops and distributes solar heating systems and other related products which involve heating and air-conditioning. Installations are made in residential commercial and industrial units.

Products include:

1. Space-Gard High Efficiency Air Cleaner.
2. SUNCELL Air-to-Air Solar Heating Systems. These were were installed in 3 homes near Madison, WN and were developed for research purposes.

# SECTION 11.0

# AIR MANAGEMENT SYSTEMS AND ENERGY AUDITS

## GOVERNMENT (PROVINCIAL/STATE)

### NORTHWEST TERRITORIES GOVERNMENT SERVICES

Contact: J.A. Severn

Energy Conservation Division
Government of the N.W.T.
Yellowknife, N.W.T.
X1A 2L9

This department is sponsoring a Canada/Northwest Territories Conservation and Renewable Energy Demonstration Program.

Project inventory includes a government office building energy audit at Yellowknife.

### ONTARIO MINISTRY OF ENERGY

Contact: The Advisor

Energy Conservation in Religious Buildings
56 Wellesley Street W.
Toronto, Ontario. M7A 2B7
(416) 965-3053

The Ministry advises congregations on energy management and provides them with methods and checklists that will help in starting an energy conservation program in their church facility or structure. A booklet is supplied on the topic of energy management called "Energy Saving in Religious Buildings."

### STATE OF ALASKA DIVISION OF ENERGY AND POWER DEVELOPMENT

Contact: Mr. Steve Baden
Public Info. Officer

338 Denali
7th Floor, MacKay Building
Anchorage, Alaska
U.S.A. 99501
(907) 276-0508

The Alaska Division of Energy and Power Development's primary concern is the development, management and efficient use of Alaska's energy resources and the conservation of energy.

Project inventory:

1. Residential Energy Audits. The Division trains and certifies residential energy auditors across the state to perform home energy audits and provides financial subsidies to homeowners requesting an audit. Approximately 40,000 audits have taken place since December 1980. Grants are available up to $300 for energy-saving improvements recommended by energy audits.

STATE OF MICHIGAN
DEPARTMENT OF COMMERCE

Contact: Tom Stanton

Energy Administration
P.O. Box 30228
Lansing, Michigan.
U.S.A. 48909
(517) 373-0480

The state-wide Community Energy Management (CEM) program has been developed to help Michigan communities develop their potential for energy efficiency. Heat loss from homes and businesses participating will be recorded by thermographic equipment. Free energy audits will be provided for small commercial and manufacturing structures.

Refer also to Section 5.0.

GOVERNMENT (MUNICIPAL)

CITY OF NORTH YORK

5100 Yonge Street
North York, Ontario. M2N 5V7
(416) 224-6463

Contact: Mr. Donald Armitage

The North York Municipal Energy Audit Program is a joint provincial-municipal program having three objectives: to perform a historical audit of energy consumption and costs for all municipally-owned buildings; to undertake a broad range of retrofit measures designed to both reduce energy consumption and eliminate areas of energy waste and to monitor the results of these changes in order to assess the success of these retrofit measures. The project is jointly funded by the City of North York and the Ministry of Municipal Affairs and Housing and will be completed by January 1985.

## RESEARCH INSTITUTIONS

### UNIVERSITY OF CALGARY

2500 University Drive N.W.
Calgary, Alberta. T2N 1N4
(403) 284-5731

The following professors are involved in the area of energy management research:

1. Dr. G. Walker.
2. Dr. D.H. Norrie - energy management research in buildings and the use of finite elements to solve energy-related problems.
3. Dr. J.A.C. Kentfield - energy management, wind power, efficiency of combustion and pulsed combustor research.

Refer also to Sections 2.4, 4.4 and 14.4 for more information on the university's research endeavours.

### NEW BRUNSWICK COMMUNITY COLLEGE
Moncton Campus

Dept. of Continuing Education
P.O. Box 2100
Moncton, N.B. E1C 8H9
(506) 384-4397

In addition to the installation of standard retrofitting and an active solar heating system in a retail structure, the college has started a Building Maintenance Technical Course which will include energy management systems, etc. The course will run for 2 years. (2400 hours).

### UNIVERSITY OF WESTERN ONTARIO

Contact: Dr. J.D. Tarasuk

Faculty of Engineering Science
London, Ontario.
N6A 5B9

The faculty is involved in developing energy management strategies for the City of London, Ontario. The project is in the initial stages as of August 1982.

**RESEARCH INSTITUTIONS** (continued)

UNIVERSITY OF WINDSOR

Contact: Prof. W.G. Colbourne

Mechanical Engineering Dept.
Building Energy Group
Windsor, Ontario. N9B 3P4

Project Inventory:

1. A Comparative Study of Methods to Determine Annual Energy Consumption for Space Heating.
   This project determines the annual energy required for space heating in conventional two-storey houses by the traditional degree-day method and by computer simulation using the DOE-2 program. The results of these methods are compared to the actual metered energy used by 75 houses of the same design and construction, all located in the same subdivision.

2. A Study of Retrofit Measures on Older Homes Using DOE-2 Simulation.
   An actual house will be simulated on DOE-2 and annual energy use for heating as determined by computer simulation will be compared with the actual records of fuel consumption. Various retrofit measures will then be itemized and added to the simulation. Cost information on each measure will be gathered from local contractors and life-cycle costing techniques will be applied. The retrofit measures will then be listed in the order of decreasing cost effectiveness.

3. A Study of Infiltration in Houses Using Encore Canada as the Basis of Correlation.
   This project attempts to develop an empirical relationship for infiltration for a particular house type which may be used in energy analysis programs and performs pressurization tests to show that they are a reasonable test for house tightness to be used in a building energy code. An actual house was selected for the performance of tests on infiltration and fan pressurization. The same house would be simulated on Encore Canada and a correlation of the variables would be made based on the computer simulation.

4. Confirmation of Optimum Insulation Levels on New Houses for Canadian Cities Using DOE-2.
   This project's objective is to confirm the optimum insulation levels for new houses using DOE-2 and weather tapes for selected Canadian cities.

## RESEARCH INSTITUTIONS (Foreign)

**BUILDING RESEARCH ESTABLISHMENT**

Contact: Dr. D.J. Fisk
Engineering Div. Head

Department of the Environment
Building Research Station
Garston, Watford
ENGLAND. WD2 7JR
(0927-3) 74040 ext. 7151

The majority of the BRE Research Program supports the Department of the Environment in its policy responsibilities for housing, energy conservation, and environmental protection.

Project Inventory:

1. Electrical Services and Microelectronics. The objectives of this project were to assess the cost-effectiveness of microprocessor-based energy management systems for Government-owned buildings (in the areas of space heating, lights, access and vertical transport); to provide design guidance on the control software that should be used by microelectric devices for the construction industry, building owners and UK manufactures and to assess the implications for energy conservation in buildings of the use of microelectronic technology.

2. Infrared Thermography. The objectives of this project were to develop the application of infrared thermographic techniques for use in determining building performance, particularly in relation to the detection and quantification of building heat loss but including other possible uses such as non-destructive testing and the assessment of comfort conditions.

## ARCHITECTURAL FIRMS

**THE BAE GROUP**

53 Bond Street, P.O. Box 6900
St. John's, Nfld. A1C 6H3
Contact: Douglas R. Morris
(709) 722-4622

Refer to Section 12.0 for a detailed description of the firm's services and projects.

**BITTORF HOLLAND CHRISTIANSON**

107 Revillon Bldg.
10221 - 104 Street
Edmonton, Alberta. T5L 1B6
Contact: Johnathon Weizel
(403) 424-2171

The architectural firm designs air management systems, control systems and retrofit alternatives. In addition, they provide financial and economic analysis.

Projects include a 30-storey office building and a classroom with laboratory for a Community College.

**COMMERCIAL DRAFTING SERVICES**

2602 - 8th Street E., Box 1852
Saskatoon, Saskatchewan.
Contact: Al Treppell
(306) 373-3161

Refer to Section 8.2 for a detailed description of the firm's projects and services.

**HENRY LORENZEN ARCHITECT LTD.**

1945 Scarth Street, Suite 5
Regina, Saskatchewan. S4P 2H2
Contact: Henry Lorenzen
(306) 352-4433

The architectural firm is engaged in the design of air control and monitoring systems, and environmental and building design.

Projects have included various residential and office structures. The architect has also conducted research on these structures as well as residential additions and renovations.

## ARCHITECTURAL FIRMS (continued)

**CHRIS MAKEPEACE**

9733 - 89 Avenue
Edmonton, Alberta. T6E 2S1
(403) 432-9210

Contact: Chris Makepeace

The architect offers full design work on air management systems and passive solar systems. Projects have included 5 single family dwellings.

**JEROME MARKSON ARCHITECTS**

161 Davenport Road
Toronto, Ontario. M5R 1J1
(416) 920-3131

Contact: Jerome Markson

The firm has been involved in a study on residential design changes for energy efficiency. Their involvement in the project consists of the computer design analysis to develop a hypothetical model for residential design changes for energy efficiency. The project is being funded by the Ontario Ministry of Municipal Affairs and Housing. Other firms involved in the project are Richard Drdla Associates, Peter Barnard Associates, and E. Hodgson-Jerome Markson Architects.

**MICHAEL CH. OGUS ARCHITECT**

417 Queens Quay W., Suite 300
Toronto, Ontario. M5V 1A2
(416) 362-1177

Contact: Michael Ogus

Refer to Section 14.1 for a detailed description of the firm's services and projects.

**ROBERT L. PALEY ARCHITECT LTD.**

14448 - 118 Avenue
Edmonton, Alberta. T5L 2M5
(403) 453-6855

Contact: Robert L. Paley

The firm engages in full architectural design services, site selection and master planning, and offers computer analysis of energy systems. Projects have included industrial and institutional buildings.

## ARCHITECTURAL FIRMS (continued)

**PASSIVE SOLAR DESIGNS LTD.**
204 - 10830 - 107 Avenue
Edmonton, Alberta. T5H 3B7
Contact: John R. Hughes
(403) 426-3857

The firm offers design services for retrofit, air handling systems, and residential structures in addition to providing heat loss calculations and energy audits. The firm also offers consulting services on vapour barrier technique and layout and design.

**UNDERWOOD MCLELLAN & ASSOC. LTD.**
17007 - 107 Avenue
Edmonton, Alberta. T5S 1G3
Contact: Alan Barnett
(403) 438-7722

Refer to Section 10.0 for a detailed description of the firm's services and projects.

## CONSULTING AND ENGINEERING FIRMS

**AGRICULTURAL & ENERGY ENGINEERING LTD.**
R.R. #1
Moorefield, Ont. N0G 2L0
Contact: T.M. Rothwell
(519) 323-4980

The firm's main area of activity is in energy cost reduction work involving the analysis of insulation, heat recovery, and various other technologies for residential, agricultural and industrial applications. Recent projects include:

1. Research concerning potential for sustained renewable energy production from agriculture in conjunction with the firm of Deloitte, Haskins and Sells.

**ALBERTA LELAND**
15606 - 116th Avenue
Edmonton, Alberta. T5M 3S5
Contact: Allan Clark
(403) 451-5650

The firm is involved in energy management controls and micro-processors used in retrofitting.

**ASSOCIATED ENGINEERING SERVICES LTD.**
13140 St. Albert Trail
Edmonton, Alberta. T5L 4R8
Contact: T. Madunicky
(403) 453-8111

The firm is involved in mechanical design, air management system and control, and the optimization of existing systems. Projects conducted by the firm include 2 large water treatment plants in Alberta and a high rise building.

**BENNET AND WHITE WESTERN LTD.**
707 CN Towers
Saskatoon, Sask. S7K 1J5
Contact: Len Gusikoski
(306) 244-1511

The firm offers consulting services on financial and economic analysis, feasibility studies and general contracting projects.

Projects have included Tisdale Recreation Centre, Humboldt Community Centre, Eldorado Nuclear hangar and a 3-storey office building.

## CONSULTING AND ENGINEERING FIRMS (continued)

**BRIGGS AND ASSOCIATES LTD.**
2333 Albert
Regina, Saskatchewan. S4P 2V8
(306) 352-5638

Contact: Reg Briggs

The firm offers consulting services to determine measures of energy conservation and feasibility. Projects include an office building and a boarding school.

Refer also to Section 10.0.

**CAMBRIAN ENGINEERING GROUP LTD.**
2465 Cawthra Road
Mississauga, Ontario. L5A 3P2
(416) 272-1400

Contact: Bernie Andrzejewski

The firm carried out an electrical power and energy cost review for many Weyerhaeuser plants in North America. The purpose of the study was to identify plants not operating efficiently and to suggest a course of action for reducing or smoothing out energy demands. Similar projects were carried out for several other firms.

The engineering firm has also investigated and reported on heat recovery systems for the Moose Jaw Union Hospital and Prairie Malt (Canada) Ltd.

Refer also to Sections 3.0, 6.0, 11.0, 14.1 and 14.4.

**CANADIAN RESOURCECON LIMITED**
811 Beach Avenue, Suite 309
Vancouver, B.C. V6Z 2B5
(604) 682-8691

The firm is comprised of economic consultants whose primary work is in the energy sector. Many of their studies involve the analysis of energy use in residential, commercial or industrial buildings, and the detailing of energy use strategies or recommendations.

Some of the studies include:

1. Use of energy in the commercial sector in Canada (1981)

2. Transportation sector demand restraint study - 1981.

## CONSULTING AND ENGINEERING FIRMS (continued)

**CHERITON ENGINEERING LTD.**

700 - 5555 Calgary Trail
Edmonton, Alberta. T6H 5P9
(403) 438-3811

Contact: Dave Panar

The firm has conducted energy audits on the airport in Fort St. John, a light industrial plant in Edmonton, and a College in Calgary.

Refer to Section 2.1 for a further description of the firm's services and projects.

**CURTIS ENGINEERING AND TESTING LTD.**

216 - 35 Avenue N.E.
Calgary, Alberta. T2E 2K4
(403) 276-8176

Contact: Don MacQuarrie

The firm is involved in the thermographic testing and energy audits for industrial and residential buildings. Projects include building analysis for government buildings.

**CYTECHNICS LTD.**

41 Ridgefield Crescent
Nepean, Ontario. K2H 6S3
(613) 828-4277

Provides engineering advisory and support services on alternative energy projects.

Services include:

1. Engineering analysis and studies.
2. Project management.
3. Technical writing.
4. Manufacturer representation to Federal Government and agencies in the Ottawa area.

**DEAN CONSULTING ENGINEERING LTD.**

2B - 806 Spadina Crescent East
Saskatoon, Saskatchewan.
(306) 665-6886

Contact: Ron LaFabe

The firm is involved in the design of control systems and air management systems. Consulting services include financial and economic analysis, feasibility studies, energy audits, and determination of energy conservation measures.

## CONSULTING AND ENGINEERING FIRMS (continued)

**DILLON CONSULTING ENGINEERS AND PLANNERS**

47 Sheppard Avenue East
Willowdale, Ontario.
(416) 229-4646

Contact: Daniel Paquette

The firm is involved with many aspects of energy-efficient designs.

Examples in this area include:

1. Industrial Energy Analysis, City of Windsor.

Refer also to Sections: 1.0, 2.1, 3.0, 4.1, 6.0, 8.0, 15.0, 18.0, and 19.0.

**DIRK AND PRICE ENGNEERING LTD.**

3410 - 3 Avenue N.W.
Calgary, Alberta. T2S 0M2
(403) 283-4323

Contact: Chuck Price

The firm offers design services on control and air management systems, and solar and retrofit structures. In addition, the firm engages in financial and economic consulting services, electrical design, feasibility studies, and performance monitoring. Projects are varied.

**DUMAC ENGINEERING LIMITED**

5949 College Street
Halifax, Nova Scotia. B3H 1X6
(902) 429-2350

The firm specializes in energy conservation and design. Projects have included an energy management study and several energy audits for the institutional and residential building sectors.

**ENVIRONMETRICS CANADA (1981) LTD.**

700 - 5555 Calgary Trail
Edmonton, Alberta. T6H 5P9
(403) 438-3822

Contact: Tom Dontigny

The firm offers consulting services on control analysis, operating procedures and preventative maintenance programs. The firm also provides energy audit services and prepares air balance and water balance operation/maintenance manuals.

## CONSULTING AND ENGINEERING FIRMS (continued)

**FERGUSON, NAYLOR, SIMEK, CLARK LTD.**
4912 - 53 Street, Box 1777
Yellowknife, N.W.T. S1A 2P4
Contact: Dana Ferguson
(403) 920-2882

The firm offers the following services:

1. Design of municipal water systems and heat recovery systems.
2. Architectural and engineering consulting.
3. Energy audits on institutional consulting.
4. Technical and financial analysis on heat recovery networks.
5. Computer simulations and energy advice.

**HARDY ASSOCIATES (1978) LTD.**
221 - 18 Street S.E.
Calgary, Alberta. T2E 6J5
Contact: D. Emprey/J. Vlooswyk
(403) 248-4331

The firm specializes in building sciences in the area of material failure analysis, envelope air leakage/water penetration, and cause, effect and remedy of these two areas. Projects have included air leakage and water penetration evaluations during design and construction phases. The firm wishes to expand to service existing structures and roof elements.

**HASEGAWA ENGINEERING LTD.**
416 Meridian Road S.E.
Calgary, Alberta. T2A 1X2
Contact: Terry Mulliger
(403) 285-2412

Energy audits have been performed by the firm on the projects listed under Section 8.2. Refer to Section 8.2 for a more detailed description of the projects.

**IBI GROUP**
156 Front Street W., 6th Floor
Toronto, Ontario. M5J 2L6
Contact: Harold J. Katzin
(416) 596-1930

Projects include:

1. Simplified Home Energy Analysis Technique
2. Electrical Energy Management Strategies for the Ontario Ministry of Energy
3. Aspects of Residential Energy Audit Programs for the Ontario Ministry of Energy.

cont....

## CONSULTING AND ENGINEERING FIRMS (continued)

4. Energy Audit for Agriculture Canada laboratory building
5. Energy Conservation Potential and Residential Audit Procedures for Saskatchewan
6. CN Rail Diesel Shop Energy Audit

Refer also to Sections 1.0, 2.1, 2.2, 5.0, 8.4, 14.1, 14.3, and 14.4.

BILL JOHNSTON COLLABORATIVE LTD.
419 - 16 Street N.W.
Calgary, Alberta. T2N 3C9
Contact: William A. Johnston
(403) 283-3880

The firm is involved in the design of air management and control systems, retrofit design, financial and economic analysis, and full architectural design services. Projects include 4 single family dwellings and a hospital swimming pool.

JO-TECH CONSULTING LTD.
1911 - 36 Street S.W.
Calgary, Alberta. T3E 2Y8
Contact: Jits Oishi
(403) 246-0141

The firm specializes in the design of air management, heating, ventilation, and air-conditioning systems. Projects have included a health-office structure and an industrial plant.

LINRIDGE CONSULTANTS LTD.
10917 - 81st Avenue
Edmonton, Alberta. T6G 0S1
Contact: Louise Bastien
(403) 432-0435

The firm offers basic design services, financial/economic analysis, and research on systems for energy conservation. This firm was involved in a report entitled "The Rational House" for the government.

MANUTEC LTD.
10951 - 120 Street
Edmonton, Alberta. T5H 3P5
Contact: John Chomiak
(403) 452-5259

The firm engages in architectural, air management and control system design. Projects have included the design of shopping and office complexes, and a health centre. The firm has also conducted a study on energy conservation in high rise buildings for the National Research Council of Canada.

## CONSULTING AND ENGINEERING FIRMS (continued)

MARSHALL MACKLIN MONAGHAN LIMITED
275 Duncan Mill Road
Don Mills, Ontario. M3B 2Y1
Contact: D.W. Beasley
(416) 449-2500

Refer to Section 14.1 for a detailed description of the firm's services and projects.

McCARTAN, GAUDET AND ASSOCIATES LTD.
325 - 5th Avenue North
Saskatoon, Sask. S7K 2P7
Contact: Mark Gaudet
(306) 244-4285

The firm specializes in the design of air management systems and retrofit as well as offering consulting services in the areas of heating, ventilation, air-conditioning and mechanical. Projects completed by the firm include the design of the University of Saskatchewan energy system consisting of geothermal and conventional energy sources and the solar heating-domestic water system at the Moose Jaw Air Force Base.

MOFFAT ENGINEERING LTD.
90 Eglinton Avenue East
Toronto, Ontario. M4P 2Y3
(416) 488-5522

Refer to Section 14.1 for a detailed description of the firm's services and projects.

NOVA ENGINEERING LTD.
3210 - 118 Avenue, Suite 214
Edmonton, Alberta. T5W 4W1
Contact: D.E. Holte
(403) 471-3550

The firm specializes in the design of air management and control systems, and air and water heat recovery systems. They are part of a design team aimed at designing a low energy "buildable" house. They also perform energy audits, feasibility studies, and mechanical engineering consulting services. Projects range from institutional structures to commercial buildings.

NOVAMETRIC ENGINEERING
Box 8163, 222 Cardinal Crescent
Saskatoon, Sask. S7K 6C4
Contact: Allan Bens
(306) 373-4965

Refer to Section 16.0 for a detailed description of the firm's services and projects.

CONSULTING AND ENGINEERING FIRMS (continued)

ANNA PARKINSON URBAN CONSULTANTS LTD.
1200 - 6 Street S.W., Ste. 10
Calgary, Alberta. T2R 1H3
Contact: Anna Parkinson
(403) 262-6445

The firm engages in fact finding for various Government Departments in the area of social impact and municipal finance. The firm has also engaged in research for the Energy Conservation Branch of Alberta Energy and Natural Resources on Municipal Energy Conservation.

QU'APPELLE ENGINEERING LTD.
1890 College
Regina, Saskatchewan. S4P 1C3
Contact: Vic Lamontagne
(306) 522-1691

The firm designs air management systems and low energy consuming systems, financial/economic analysis and feasibility studies.
Projects include institutional and recreational structures.

R.P.A. CONSULTANTS LIMITED
400 Mount Pleasant Road
Toronto, Ontario. M4S 2L6
Contact: John K. Tattersall
(416) 485-4231

The firm specializes in project and construction management on a wide variety of capital-intensive projects including those for cold climate considerations.

Projects have included:

1. Nanisivik Town and Recreation Centre located at Nanisivik, Baffin Island. The housing community facilities built included a school, recreation area, general store, R.C.M.P. station, firehall, government offices, municipal garage, post office, and nursing station.
   Designed by Zeidler Partnership (Toronto).
2. Single family dwellings and row housing at Eskimo Point and Rankin Inlet, N.W.T. The architect on the project was Peter L.E. Goering of Toronto. However, the designs were abandoned in 1977 in favour of lower-cost short life pre-fabricated huts.
3. Arctic Pilot Project consisting of a conceptual design of land-based accommodation and recreation facility located at Bridport Inlet on Melville Island, N.W.T. Architect was Peter L.E. Goering of Toronto.

cont....

## CONSULTING AND ENGINEERING FIRMS (continued)

4. Polar Gas Project consisting of an aircraft hanger with supporting maintenance shops and office accommodation to be constructed at five divisional headquarters along the proposed natural gas pipeline from the Arctic. Three of the headquarters were in N.W.T., one in Manitoba, and on in Ontario. Architect on the project was Peter L.E. Goering of Toronto.

SASKMONT ENGINEERING COMPANY LTD. 3311 - 8th Street East
Saskatoon, Saskatchewan.
Contact: Jim Hutch (306) 374-6262

The firm designs air management, control and heat storage systems as well as retrofit. The firm engages in financial and economic analysis, measures of energy conservation, and feasibility studies. The firm also performs energy audits on buildings such as the Valhalla apartments, the Lawson Swimming Pool and a post office in Regina.

SEER CONSULTING LTD. 333 - 25 Street East, Suite 312
Saskatoon, Sask. S7K 0L4
Contact: Scott Dalgetti (403) 665-2797

Refer to Section 8.1 for a detailed description.

STANLEY-ECONO 10512 - 169 Street
Edmonton, Alberta. T5P 3X6
Contact: David Gill (403) 483-4777

The firm is involved in the design of air management systems, retrofit, architectural, district heating, co-generation energy conservation, and heat and power engineering. They also offer consulting services on district heating evaluation.

Projects include:

1. Energy supply and conservation schemes in Canada, Austria, Norway, Switzerland, Sweden, Soviet Union, United States, and Finland.
2. District heating evaluation of Edmonton downtown core.

## CONSULTING AND ENGINEERING FIRMS (continued)

**SUNCORD ENGINEERING LTD.**

9006 - 132nd Avenue, Ste. 307
Edmonton, Alberta. T5E 0Y2
(403) 473-2111

Contact: John Stewart

The firm designs air management systems, performs energy audits, and has been involved in various energy studies.

Projects conducted by the firm include the following:

1. Design of several office and industrial buildings
2. Whitehorse energy study and retrofit for Yukon Government
3. Northern Canada Power Commission in Inuvik - district heating study
4. Energy and operational problems study of Misericordia Hospital
5. Various energy audits.

**THERMAL FOCUS INC.**

P.O. Box 426, Sub 6
Saskatoon, Sask. S7N 0W0
(306) 374-6300

Contact: Mike Stoneham

The firm offers design services ranging from mechanical services to envelope itself. The firm also engages in thermography consulting. Examples of projects include the Saskatchewan Research Council Retrofit Program, a Public Works Canada Study to develop inter-disciplinary inspection, and design and on-going thermographic services to Public Works Canada.

**TRITECH CONSULTANTS LIMITED**

191 A Lakeshore Road East
Oakville, Ontario.
L6J 1H5

Contact: Mr. Donald Halford

The firm is involved in the study of energy conservation methods and the evaluation of design details that will succeed in the prevention of energy loss and building deterioration. The company attempts to analyze the reasons for excessive energy consumption in a structure by examining the actual construction at the site and the architectural, structural, electrical and mechanical drawings and specifications in their office. The actual structure is thermographically scanned to pinpoint heat losses. When the probable points of air infiltration or exfiltration is determined, their staff prepares detailed drawings indicating what corrective construction is required.

See Section 8.3 for a further list of projects.

## CONSULTING AND ENGINEERING FIRMS (continued)

TROW LIMITED
Contact: John J. McClone

43 Baywood Road
Rexdale, Ontario. M9V 3Y8
(416) 749-1290

The firm has recently completed an energy conservation study of an office and testing laboratory building. In the study, the firm proposed improvements for the energy use in the building.

UNDERWOOD MCLELLAN & ASSOCIATES LTD.
Contact: Alan Barnett

17007 - 107 Avenue
Edmonton, Alberta. T5S 1G3
(403) 483-7722

Examples of energy audit projects include:

1. Energy audit of a warehouse and office building
2. Mechanical and Project Engineer with the Research Council of Edmonton.

Refer to Section 8.2 for a detailed description of the firm's services and projects.

VINTO ENGINEERING
Contact: Bob Campbell

10950 - 119 Street
Edmonton, Alberta. T5H 3P2
(403) 452-1800

Refer to Section 8.2 for a description of projects and services offered by the firm.

WASHBURN AND GILLIS ASSOCIATES LTD.
Contact: Sheila Washburn

70 York Street
Fredericton, N.B. E3B 3N5
(506) 454-0213

The firm specializes in environmental consultation. Projects in the area of management evaluation consist of a residential energy audit. This project reviewed residential energy audit programs and developed procedures for the Canadian Electrical Association. Refer also to Section 5.0.

## CONSULTING AND ENGINEERING FIRMS (continued)

**WAYNE WIKLINSON, CONSULTING**

7 Ketza Road
Whitehorse, Yukon. Y1A 3V3
(403) 667-4933

Contact: Wayne Wilkinson

Refer to Section 8.2 for a detailed description of projects and services offered by the firm.

**YONEDA AND ASSOCIATES LTD.**

1905 - 7th Avenue
Regina, Saskatchewan.
(306) 525-5267

Contact: Scott Phillips

The firm is involved in cost analysis and feasibility studies aimed at reducing energy use in existing buildings. The firm also performs energy audits.

Projects have included reseach for the Federal Government on the reduction of energy in buildings, energy audits on the Crown Investments Office Building and a solar house.

Project inventory includes:

1. Energy audit reports on commercial and institutional buildings.
2. Single family dwelling heat pump energy study
3. Computer energy analysis of a research/development centre and science museum.
4. Computer energy analysis of several institutional and government buildings.
5. Feasibility study on solar replacement applicability.
6. Study of energy consumption of Canadian Office Buildings and several other reports commissioned by the National Research Council of Canada.

## MANUFACTURING FIRMS

ACRO FOAM AND WOODCRAFTS LTD.
Contact: Ernie Deslaurier

R.R. #2, Sherwood Park
Edmonton, Alberta. T8A 3K2
(403) 922-5094

The firm manufactures Poly Vapour Hats. This product is used in the residential and light industrial sectors.

CONTROL DEVICES
Division of A.E.L. Microtel Ltd.
Contact: Geoff Fitzgibbon

14605 - 134 Avenue
Edmonton, Alberta. T5L 4S9
(403) 451-1440

The firm produces the System 10 and Telemac which monitors energy usage. This type of product is used in many of the building sectors.

NOVAMETRIC ENGINEERING
Contact: Allan Bens

222 Cardinal Crescent, Box 8163
Saskatoon, Sask. S7K 6C4
(306) 373-4965 or 242-1185

The firm manufactures an R-value meter which is a device for measuring thermal resistance in exterior walls. The product is used in residential, commercial, retail, and light industrial buildings.

S.T.C. CONTROLS LTD.
Contact: Larry Peterson

General Delivery
Cochrane, Alberta. T0L 0W0
(403) 932-4325

The firm manufactures Tasc Micro Processor Control Systems. The micro processor is designed to control and monitor a variety of processes. This type of product is used in residential, commercial, retail, and light industrial building sectors.

The firm also engages in various feasibility studies. These include:

1. Energy management study for Parks Canada
2. Solar heating study for Coutenay Parks Administration Building and Parks Canada.
3. Engineering design study for industrial application of heat pumps for Department of Supply and Services.

## DEVELOPMENT AND CONSTRUCTION COMPANIES

**AMBER HOME LTD.**
Contact: Keith Adamson

1016 - 8 Street East
Saskatoon, Sask. S7H 0S2
(306) 373-4998

The firm specializes in general contracting and design services. The firm's designs feature air tight design, air-to-air heat exchangers, and super-insulation. Projects conducted by the firm include one of the HUDAC homes in Saskatchewan.

**CH 2 M HILL CANADA LTD.**
Contact: Steve Lackey

1110 Center Street North
Calgary, Alberta. T2E 2R2
(403) 230-4381

The firm is involved with the design of heating and air-conditioning, air management, and waste heat utilization systems as well as performance monitoring. Projects include the preliminary design for waterheat utilization, the conceptual design for Tar Sands extraction plant, Calgary Power Station (thermal), and a cooling efficiency test.

**CONLEY AND COMPANY CONTRACTORS LTD.**
Contact: Greg Sturgeon

205 McDonald North
Regina, Saskatchewan. S4N 5W2
(306) 545-7447

The firm offers design, consulting, and construction services. Design services include air management and control systems and retrofit. Consulting services include budget justification.

The construction services offered are general and mechanical contracting. Projects include the design of several office and commercial structures, and the construction of single family and condominium dwellings.

**EDGEMONT HOMES LTD.**
Contact: Ed Michalchuk

20 Edgemont Court
Calgary, Alberta. T3A 2K6
(403) 239-1111

The firm is involved with basic structural and air management system design. They also offer financial and economic analysis, and feasibility studies. Projects have included an energy-efficient show home for the HUDAC demonstration program in Calgary in addition to 8 energy-efficient homes.

## DEVELOPMENT AND CONSTRUCTION COMPANIES (continued)

LEMOR DEVELOPMENTS LTD.

15023 - 118 Avenue
Edmonton, Alberta. T5V 1H9
(403) 453-1581

Contact: Robert W. Lemieux

The firm is involved in the design of air-to-air heat exchangers and poly vapour hats for their building projects. The development company also offers consulting services on window design, tree planting, and other factors. Projects include 4 energy-efficient homes.

LEON'S CARPENTRY

9536 - 155 Street
Edmonton, Alberta. T5P 2K4
(403) 484-3198

Contact: Leon Levesque

The firm offers energy-related consulting services aimed at checking house plans for vapour barrier design. Projects completed have involved single family dwellings.

MACGILLIVRAY CONTRACTING AND DESIGN

126 - 9th Street East
Saskatoon, Sask. S7N 0A2
(306) 664-3256

Contact: Archie MacGillivray

Refer to Section 8.2 for a description of the firm's services and projects.

NU CENTRAL HOMES

Mobile 3 - 701 - 45 Street West
Saskatoon, Sask. S7L 5W5
(306) 665-6661

Contact: Stu Harris

Refer to Section 8.2 for a description of the firm's services and projects.

NU-WEST DEVELOPMENT CORP. LTD.

9440 - 46th Street
Edmonton, Alberta. T6B 2M9
(403) 468-7080

Contact: Marvin Gibbs

The firm is involved in air management and insulation system design. Projects conducted by the firm include 30 homes in Sherwood Park, a passive solar home for HUDAC Parade of Homes, and the construction of 2 homes using polystyrene insulating panel for the exterior. These two homes were monitored for energy efficiency as to air infiltration.

## DEVELOPMENT AND CONSTRUCTION COMPANIES (continued)

PRESTON CONSTRUCTION
11821 - 123 Street, Suite 103
Edmonton, Alberta. T5L 0G7
Contact: Joyce Horton
(403) 454-0728

The firm is involved with design services to encourage extra insulation and energy conservation in buildings as well as performing financial and economic analysis. Projects include a 20-suite low rise complex and a fully energy-efficient home.

STANTON HOME 'EDMONTON' LTD.
11825 - 145 Street
Edmonton, Alberta. T5L 2H4
Contact: Reg Copithorne
(403) 451-1060

The company is involved in architectural design and the design of air management systems as well as providing general contracting services. They have completed 12 energy-efficient homes.

TRIPLE R CONSTRUCTION
113 Smith Street East
Yorkton, Sask. S3N 0H8
Contact: Bob Ross
(306) 782-1453

The firm offers retrofit and air management system design in addition to general contracting. Projects completed by the firm include 2 projects for the Saskatchewan Housing Corporation and several additional energy-efficient homes.

WIMPY WESTERN
3720 -76th Avenue
Edmonton, Alberta. T5J 2N7
Contact: Phil Johnson
(403) 465-5317 or 468-6121

The firm designs air management systems and retrofitting techniques. They also offer financial and economic analysis, feasibility studies related to energy conservation, and research and performance monitoring on projects.

## EQUIPMENT AND SUPPLY FIRMS

**EDEN ENERGY EQUIPMENT LTD.**

Eden Mills, Ontario. N0B 1P0
(519) 821-8478

Contact: Richard Lay

The firm specializes in residential and agricultural air-to-air heat recovery. For more detailed information on services and projects, contact Mr. Richard Lay.

**GENERAL INSULATORS**

Edmonton, Alberta.
(403) 465-6542

Contact: Murray Livingstone

The firm installs insulation and air infiltration systems. Projects have included the insulation of 7 energy sufficient homes and performance monitoring of air flow in 2 homes.

**INTERNATIONAL RADIOGRAPHY AND INSPECTION SERVICES (1976) LTD.**

9937 - 60th Avenue
Edmonton, Alberta.
(403) 437-2022

Contact: Brian Shmear

The firm utilizes infrared cameras to perform thermal analysis on buildings. Projects have included numerous homes and financial buildings, warehousing/office complexes, and high rise structures. These projects have been performed under the C.H.I.P. program.

## OTHER ORGANIZATIONS

### CHURCH OF SCOTLAND

General Trustees Secretary's Department
121 George Street
Edinburgh, SCOTLAND. EH2 4YR
(031) 225-5722

Contact: Mr. Lindores
Mr. Allan W. Cowe

The development of an effective and coherent policy of energy conservation in Churches and properties owned and managed by the Central Committees of the Church of Scotland was started in 1979. Energy surveys conducted by outside energy consultants (see below) were administered to interested congregations with the final objective being implementation of relevant physical changes in Church buildings. The Department of Energy will refund up to 75 Pounds of the cost of these surveys.

Consultants involved:

Mr. Brian Marks
17 Banchory Avenue
Inchinnan, Renfrew
SCOTLAND. PA4 9PX

## SECTION 12.0

## STRUCTURAL, MECHANICAL AND ELECTRICAL METHODS

GOVERNMENT (FEDERAL)

CANADA. ENERGY MINES AND RESOURCES

Earth Sciences Branch
Ottawa, Ontario. K1A 0E4

EMR, Earth Sciences Branch under their Research Agreement Program (RAP) has provided grants for the last 2 years to Canadian Universities undertaking research projects dealing with energy and/or Canada's natural resources.

Examples of research performed include:

1. Direct solar gain in a northern climate, University of Alberta.
2. Alternate energy technology catalogue system, Centennial College of Applied Arts and Technology.

OREGON DEPARTMENT OF ENERGY

Labor and Industries Bldg.
Salem, Oregon. U.S.A. 97310

The project was a field study of moisture damage in walls insulated without a vapour barrier done in Portland, Oregon in 1979. Other firms involved were:

1. Seton, Johnson + Odell, Inc. - Portland
2. Applied Social Research Inc. - Portland
3. George A. Tsongas of Portland University

## ARCHITECTURAL FIRMS

THE BAE GROUP
53 Bond Street, P.O. Box 6900
St. John's, Nfld. A1C 6H3
(709) 722-4622
Contact: Douglas R. Morris

The firm specializes in architectural, structural, mechanical, and electrical services for commercial, institutional and industrial buildings. They also specialize in planning, energy conservation, heat recovery, energy audits, and feasibility studies. Projects have included:

1. Menihek High School incorporation special insulation, window treatment, ventilation and heat recovery.
2. C.R. Mine Engineering Building
3. Cartwright Water and Sewer System using a deep burial technique.
4. Main Water and Sewer System using a deep burial technique and utilizing gravity flow to reduce energy consumption.

FORBES, LORD, FELDBERG, SCHMIDT AND CROLL ARCHITECTS
10437 - 123 Street
Edmonton, Alberta. T5N 1N8
(403) 488-4806
Contact: Craig Henderson

The firm specializes in the design of mechanical, electrical and passive solar energy systems. The firm also conducts energy audits and performance monitoring of single family dwellings. Projects include several institutional buildings and the Esso Resources Canada office building.

BRUCE MCFADDEN ARCHITECT LTD.
14323 - 101 Avenue
Edmonton, Alberta. T5N 0K7
(403) 3231
Contact: Bruce McFadden

The firm primarily offers architectural, mechanical, electrical and structural design as well as consulting services in custom design, financial and economic analysis.

Projects include:

1. 12 energy-efficient homes ($40-$300,000 in value)
2. A solar conservation home with greenhouse.

The firm is presently in the process of securing funds for a research program in micro-technology.

## ARCHITECTURAL FIRMS (continued)

**TAWADROS ARCHITECT LTD.**

10909 Jasper Avenue, Ste. 330
Edmonton, Alberta. T5J 3L9
(403) 423-4580

Contact: Magdi Tawadros

The firm offers a complete design package including structural, mechanical and electrical. They also conduct economic feasibility studies and market analysis. They have been involved in the design of an administration building for Suncor Inc. (Fort MacMurray), an office/hotel complex (Toronto), and an 82-unit residential project in Newmarket, Ontario. The firm has also begun research into the use of passive solar energy in buildings.

## CONSULTING AND ENGINEERING FIRMS

CO-ORDINATED ENGINEERING LTD.
17308 - 108 Avenue
Edmonton, Alberta. T5S 1E8
(403) 483-8880
Contact: Wayne R. Schmidt

The firm provides design services of electrical systems and load shedding, and consulting services on energy efficiency.

Projects include the design of the Space Science Centre in Edmonton, Manulife Centre, Eldorado Nuclear office building, a Native Education Centre, and several institutional and industrial buildings.

DIRK AND PRICE ENGINEERING LTD.
3410 - 3 Avenue N.W.
Calgary, Alberta. T2S 0M2
(403) 283-4323
Contact: Chuck Price

Refer to Section 11.0 for a detailed description of the services and projects offered by the firm.

EMANS, SMITH, ANDERSON ENGINEERING LTD.
116A - 8 Avenue S.E., Suite 300
Calgary, Alberta. T2G 0K6
(403) 261-8897
Contact: Scott Emmonds

The firm offers design services in the areas of mechanical, engineering and heating, financial/economic analysis, and feasibility studies. Examples of projects include the Shell Centre, Digitec Building, and the Calgary City Hall.

HASSEN'S HOME AND ENERGY CONSULTANTS LTD.
833 Cynthia Street, Bay 4
Saskatoon, Saskatchewan.
S7L 6C2
(306) 665-2199
Contact: Larry Hassen

The firm designs double wall construction, R16 ceiling, R30 walls, and air management systems. They also give free estimates on residential potential work.

Projects include 4 houses already constructed and 2 in the draft stage.

## CONSULTING AND ENGINEERING FIRMS (continued)

KEN HUTCHINSON ARCHITECT LTD.
1518 - 7 Street S.W., Ste. 200
Calgary, Alberta. T2R 1A7
Contact: Ken Hutchinson

The firm specializes in architectural, mechanical, and electrical design services, feasibility studies, and financial/economic analysis. They have been involved in the design of the Calgary Sun Printing Plant and Office heating system which reutilizes heat from industrial equipment, and several other commercial and institutional structures.

JARVIS ENGINEERING LTD.
10434 - 122nd Street
Edmonton, Alberta. T5N 1M3
Contact: Dwayne Pearson
(403) 482-4477

The firm specializes in electrical design on lighting, power distribution, and safety systems. Projects include office and institutional buildings. The firm also conducts energy audits for office and institutional buildings.

KEITH CONSULTING
766 Angus
Regina, Saskatchewan.
Contact: Cliff Beatty
(306) 525-2171

The firm offers architectural, structural, mechanical, and electrical design services as well as conducting energy audits. They have performed these services for a recreational structure, school, and several office buildings.

MECHANICAL CONSULTANTS WESTERN
10310 - 102 Avenue, Suite 309
Edmonton, Alberta. T2J 2X6
Contact: Jeff McDonell
(403) 428-9215

The firm is involved in complete mechanical designs for heating, ventilating, and plumbing systems. The firm also conducts energy audits, financial and computer analysis, and feasibility studies. Projects have included commercial and retail structures, and a government computer centre in Vancouver.

## CONSULTING AND ENGINEERING FIRMS (continued)

### MIDDLETON ASSOCIATES

2114 Robinson Street
Regina, Saskatchewan. S4T 2P7
(403) 522-6545

Contact: Mike Schell

The firm engages in mechanical design, energy performance monitoring, strategic planning, feasibility studies, and various other consulting services. The firm has been involved in several energy conservation consulting projects for remote northern communities. For details, contact Mr. Schell.

### REID CROWTHER PARTNERS LTD.

17704 - 103rd Avenue
Edmonton, Alberta. T5N 3V9
(403) 483-3920

Contact: Lorne Wilson

The firm specializes in mechanical, electrical, and structural design of air management systems. Projects have included a government building and a testing station. The firm has also performed energy audits for the City of Edmonton.

### SASKMONT ENGINEERING CO. LTD.

10408 - 124 Street, Suite 201
Edmonton, Alberta.
(403) 482-7351

Contact: Stanley Hayden

624 - 36 Street N.E.
Calgary, Alberta.
(403) 273-6325

Contact: David Lemko

The firm offers all necessary engineering services for structural, electrical or mechanical structures. As well, they offer consulting services on design alterations, financial/economic analysis, and feasibility studies. Other services included applications of solar systems to improve heating in institutional buildings, and research studies in Saskatchewan on the use of glauber salts for heat storage.

Types of projects included recreational facilities, government buildings (i.e. post office, prison), and a $650 million complex in Singapore.

## CONSULTING AND ENGINEERING FIRMS (continued)

**TAN AND ASSOCIATES**
**ENGINEERING LTD.**

9840 - 149 Street
Edmonton, Alberta. T5P 1K4
(403) 489-0129

Contact: Garry Holowchuk

The firm specializes in mechanical and electrical design of energy management systems, cost analysis, feasibility studies, and energy audits. They have conducted these services on various institutional and commercial structures.

**A.D. WILLIAMS ENGINEERING LTD.**

9000 Jasper Avenue, Suite 650
1 Thornton Court
Edmonton, Alberta. T5J 2E7
(403) 423-4147

Contact: Jerry Divine

The firm offers design services for structural, mechanical and electrical systems. The firm also conducts energy audits, feasibility studies, and financial/economic analysis. They have performed these services for the Yukon, The Department of Indian and Northern Affairs and the province of Alberta.

## DEVELOPMENT AND CONSTRUCTION COMPANIES

BUSCHMAN CONSTRUCTION LTD.
6018 - 35 A Avenue
Edmonton, Alberta. T6L 1G8
Contact: David Schuman
(403) 435-7778

The firm offers consulting services on structural, mechanical, and electrical design changes that will improve energy efficiency in buildings. The firm has completed 10 single family dwellings to-date.

PCL CONSTRUCTION LTD.
Box 887, 1433 1st Street
Regina, Saskatchewan. S4P 3B1
Contact: Don Briggs
(306) 525-1521

The firm provides general contracting services to architects and engineers on the electrical and mechanical portions of all projects. Examples of projects include:

1. Bank of Montreal Building
2. Shopping Centre in Prince Albert
3. Retrofit of walls in old Saskatchewan Tel Building.

# SECTION 13.0

# GRANTS AND FINANCIAL AID

## GOVERNMENT (FEDERAL)

**CANADA MORTGAGE AND HOUSING CORP.**
Housing Technology Incentives Prog.

Montreal Road
Ottawa, Ontario. K1A 0P7
(613) 748-2000

The prime purpose of the Housing Technology Incentives Program is to support the practical demonstration of innovative housing ideas which have a potential for market acceptance thereby encouraging the development of new ideas intended to improve the performance of housing. This knowledge and experience gained from the research will be made available to industry and the public. CMHC's maximum contribution for any one proposal is $15,000.

Since the list of accepted proposals and research undertaken in this area is extensive, it is advised that the above address be contacted for a detailed list of projects.

**ENERGY, MINES AND RESOURCES**

Conserv. & Renewable Energy Br.
Ottawa, Ontario. K1A 0E4
(613) 995-9447

The following projects are sponsored by the Energy Conservation and Renewable Energy Branch of EMR:

1. Atlantic Energy Conservation Investment program (EMR 38) - designed to accelerate energy conservation by private enterprise in Atlantic Canada region.
2. Buildings and Residential Super Energy Efficient Housing Demonstration program (EMR 39) will provide a total of $6 million to construct approximately 1000 super energy-efficient housing units across Canada by 1984.
3. Canadian Homes Insulation Program (CHIP - EMR 40). This branch of EMR has now assumed policy and program responsibility for CHIP. The program grants homeowners up to $500 to accelerate energy conservation retrofit to homes not energy-efficient (built before 1961).
4. Canada Oil Substitution Program (COSP - EMR 41) grants homeowners and small businesses up to $800 to help meet costs of converting heating systems from oil to more plentiful domestic energy sources.
5. Canertech (EMR 42) is a new Canadian alternate energy corporation established to further enhance the supply of renewable energy and will focus on supporting commercial production of renewable energy and conservation technology.
6. Municipal energy management program (EMR 55) to assist Canadian Communities in hiring full-time energy managers.

GOVERNMENT (PROVINCIAL)

NEWFOUNDLAND DEPARTMENT OF
MINES AND ENERGY

St. John's, Newfoundland
A1C 5C7

The Newfoundland Government, under the direction of the Department of Mines and Energy is involved in several incentive programs concerned with energy efficiency housing and urban design strategies. The programs are as follows:

1. "Builder Incentive Program for Low Energy Housing" is designed to encourage builders to become involved with the construction of energy-efficient homes. The amount of the incentive can range up to a maximum of $9000 with $6000 in the form of a loan and $3000 a grant. The finished houses must then be used for demonstration purposes to the public for at least 150 hours during a one month period.
2. "Small Scale Energy Demonstration Program" designed to interest the public in the field of energy conservation and renewable or alternate energy sources. The funds available to qualify projects are up to a maximum of $10,000 or 75% of the project cost (whichever is the lower amount). In order to receive funds, the project has to conserve energy or demonstrate a new technology relating to energy conservation or renewable resources with a 5 to 10 year pay-back period.
3. "Province-wide Retrofit Program" will provide funds to retrofit up to a maximum of 40 houses in the province. Retrofitting will be carried out with three levels (low, medium and high) at costs of $2000, $4000, and $6000 per house respectively.

# SECTION 14.0

# CONSERVATION

# SECTION 14.1

# DESIGN

## GOVERNMENT (FEDERAL)

**ENERGY MINES AND RESOURCES CANADA**
580 Booth Street
Ottawa, Ontario. K1A 0E4
(613) 995-9447

The Energy Conservation and Renewable Resources Branch of EMR offers an Arctic Housing Standards program (EMR 37). This program provides energy conservation standards for Arctic housing, taking into account climate conditions, energy supplies and costs, and future housing requirements.

The program will be developed in conjunction with the government of Quebec, Newfoundland, Yukon, and the Northwest Territories. The program will apply to all federally-funded and insured housing units constructed in these areas.

**THE HOUSING AND URBAN DEVELOPMENT ASSOCIATION OF CANADA (HUDAC)**
15 Toronto Street, 10th Floor
Toronto, Ontario. M5C 2E3

Contact: Mr. Howard French

See Section 5.0 for a description of consultants involved in energy-efficient house design as well as programs for those builders involved in this work.

**NATIONAL RESEARCH COUNCIL OF CANADA**
Montreal Road
Ottawa, Ontario. K1A 0R6
(613) 993-1421

The Energy Research and Development division of NRCC is involved in energy-efficient designs. The Council investigates energy-efficient designs in the building and transportation sectors.

| | |
|---|---|
| DEPT. OF HOUSING & URBAN DEVELOPMENT<br>Energy Building Technology Standards | 451 - 7th Street S.W.<br>Washington, D.C.<br>U.S.A. 20401 |

Contact: Orville Lee

The Energy Efficient Residence (EER) research and demonstration program is being conducted by the NAHB Research Foundation under contract to the U.S. Department of Housing and Urban Development (HUD). The purpose is to develop information and data for cost effective design and construction of energy conserving homes.

There are two phases to the EER program:

1. The EER 1 demonstration house will show how to cut energy use in half using readily available technology (ie. products design and construction techniques).
2. EER 2 will demonstrate the use of current available energy conservation technology in addition to advanced concepts such as passive solar space heating and water heating, earth source heat pump, etc.

Both projects will be monitored for one year following occupancy to determine actual performance of the special features. At the end of the program, a report will be published including guidelines for designing and building homes utilizing more advance energy-efficient concepts.

## GOVERNMENT (PROVINCIAL/STATE)

NORTHWEST TERRITORIES
GOVERNMENT SERVICES

Energy Conservation Division
Government of the N.W.T.
Yellowknife, N.W.T. X1A 2L9
(403) 873-7204

Contact: J.A. Severn

This department is sponsoring a Canada/Northwest Territories Conservation and Renewable Energy Demonstration Program.

Project inventory:

Arena Heat Recovery. The existing ice plant was modified to demonstrate the practical recovery of waste heat from an ice plant condensor to warm the spectator area of the Pine Point Arena and to reduce the operating cost burden of the municipalities. Design calculations were prepard by Ferguson-Naylor-Simek and Clarke of Yellowknife.

Another energy efficiency demonstration is at the Hudson Bay Company Staff House, which is a duplex in Frobisher Bay, Northwest Territories.

For more projects, see Sections 3.0, 5.0, 8.4, 10.0, and 11.0.

NORTHWEST TERRITORIES PUBLIC WORKS

Architectural Division
Yellowknife, N.W.T.

The Architectural Division of the Public Works Department deals exclusively with cold climate building design. Recent reports include design and construction summaries of projects involving school facilities, staff housing, and housing.

GOVERNMENT (MUNICIPAL)

CITY OF WINDSOR

Department of Planning
Room 400, City Hall
Windsor, Ontario. N9A 6S1
(519) 255-6281

Contact: Mr. J. Atkins

The Department of Planning is involved in the following projects:

1. Energy-Urban Planning and Design: A report on energy issues, problems and its implications on urban planning and design. It also includes a survey of various energy conservation measures adopted through urban planning.
   Study prepared by the Department of Planning, City of Windsor, November 1980 by Mr. Raj Verma the principal researcher. No funding was available and the report is complete.
2. Windsor Energy Profile - A Pilot Study: A pilot study to establish the energy consumption pattern for the City of Windsor.
   Study prepared by the Department of Planning, City of Windsor, April 1982 and was partially funded by a grant from the Ministry of Municipal Affairs and Housing. Report is complete, and the principal researchers were: Mr. R. Verma and Bob Hayes.

For further projects see Section 15.0.

RESEARCH INSTITUTIONS (United States)

BRADLEY UNIVERSITY

Contact: Professor Y.B. Safadi

Department of Mechanical Engineering
Peoria, Illinois.
U.S.A. 61625
(309) 676-7611

The Department of Mechanical Engineering under Professor Safadi is currently researching heating systems and energy efficiency in designs and solar collectors.

The department has recently designed a 5550 sq. foot home at Pagosa Springs, Colorado.

For more detailed description of projects, see Sections 2.4 and 8.2.

## ARCHITECTURAL FIRMS

### ADAMSON ASSOCIATES

2 Gloucester Street
Toronto, Ontario. M4Y 1L5
(416) 967-1500

This firm was involved in the architectual work for the Gulf Canada Square Building in Calgary. They have also received a Public Works/Energy, Mines and Resources Award of Merit under the Federal Government's Program of Low Energy Design Awards.

### BARTON MYERS ASSOCIATES

322 King Street West, 3rd Fl.
Toronto, Ontario. M5V 1J2

Contact: Barton Myers

The architect and planning firm has developed various enclosed living environments for institutions (primarily universities).

Examples of their projects include:

1. University of Alberta Development Plan (1969)
2. Housing Union Building, University of Alberta (Ed.)
3. Union facilities, University of Maryland (Baltimore)
4. Myers Residence (Toronto)
5. Seagram Museum (Waterloo, Ontario)
6. Unionville Library (Town of Markham)

### JOE CARTER ARCHITECT

c/o Frank Noseworthy Ltd.
5 Church Hill
St. John's, Newfoundland

Mr. Carter designs air tight, energy-efficient single family houses, usually passively oriented with double envelope features and super insulation. The following list of homes had some design input by the architect.

1. Evans House, Logy Bay, Newfoundland
2. Stiles House, Logy Bay, Newfoundland
3. Day House, Port Maitland, Nova Scotia
4. Worral House, Glovertown, Newfoundland
5. Pope House, Flatrock, Newfoundland
6. Curnew/Snow House, Topsail, Newfoundland

Monitoring of the homes' energy efficiency is being conducted by the inhabitants of the 6 houses.

ARCHITECTURAL FIRMS (continued)

**CHANDLER KENNEDY ARCHITECTURAL GROUP**

506 - 17th Avenue S.W.
Calgary, Alberta. T2S 0B1
(403) 264-6980

The architectural firm has been involved in the following energy-efficient designs:

1. Alberta Government Telephone Tower consisting of a 28-storey office building
2. Office building for the Government of Alberta
3. Proposal for the 1984 World's Fair Exhibition facility located in Alaska. The building is to be retro-fitted for educational use.
4. Design for Edmonton City Hall to provide significant energy conserving techniques and urban design objectives
5. Design of the energy conserving fabric roof structure for recreation facility to house Western Canada Games and 1984 Olympics. Facility contains a competition pool and field house.
6. Energy conserving studies for Petro Canada for the design of an energy conserving office building.

**CRAIG, KOHLER, DICKEY AND EDMUNDSON, ARCHITECTS**

200 Tremblay Road
Ottawa, Ontario. K1G 3H5
(613) 232-3521

The firm specializes in institutional, residential and commercial buildings of all sizes. The most recent project is the Ottawa Court House, designed to the Ministry of Government Services energy consumption standards.

**JOHAN DE VILLIERS**

R.R. #3, Sherbrooke Street West
Peterborough, Ontario. K9J 6X4

Contact: J. De Villiers

The architect has designed a private residence in Peterborough. The Johnston residence was privately funded. Future project planned by the architect, is the design of an underground energy-efficient home in the Bobcaygeon area.

ARCHITECTURAL FIRMS (continued)

HAMILTON KEMP ARCHITECTS

47 Colborne Street
Toronto, Ontario. M5E 1P8
(416) 363-3357

The architectural firm is involved in energy conservation and design. Projects have included a residential structure in Toronto, a commercial structure in Toronto, and a hotel complex in Kenora. For more detailed information on the projects, please contact the company.

JOHN HICKS, LANDSCAPE ARCHITECT

P.O. Box 75
Keswick, Ontario. L4P 3E1
(416) 476-3496

John Hicks is not actively involved in cold climate design. However, Mr. Hicks does include commercially proven energy-efficient products and materials in all his designs for local buildings and structures.

JOHN HIX ARCHITECTS

Contact: John Hix

282 Borden Street
Toronto, Ontario. M5S 2N6
(416) 533-8529

Refer to Section 1.0 for a detailed description of the firm's services and projects.

RUDY P. FRIESEN AND ASSOCIATES

Contact: R.P. Friesen

2074 Portage Avenue, Suite 200
Winnipeg, Manitoba. R3K 0Y2
(204) 885-3352

The firm incorporates energy-efficient strategies in their designs. Recent projects have included:

1. The design of a manufacturing and office facility. The plant has a structure and roof of precast concrete, the windows are triple glazes, and the building is super-insulated. A heat reclaim system is used in winter to recapture heat from the high volume of air that must be exhausted.
2. Design of an office building for native organizations in Thompson, Manitoba which is to utilize a combined electric/wood burning boiler for heating, with wood the main source. Also passive solar, high levels of insulation and triple glazing.

cont....

ARCHITECTURAL FIRMS (continued)

3. An administration centre for Indian band in northern Manitoba (Nelson House). The house will utilize a combined electric/wood burning boiler and will have a chimney penetrating the central 2-storey open space allowing heat to radiate out from it. Also passive solar heat will be used on the east-west axis of the building carved out to provide maximum surface exposure to the south and protection for the main entrance area. North walls will be bermed to provide additional insulation.

JONAS LEHRMAN

A 8 - 1 Roslyn Road
Winnipeg, Manitoba. R3L 0G1

Contact: Jonas Lehrman

The architect has research and written articles on urban design aspects of cold climate. Papers include:

1. "Physical Form of Northern Communities."
2. "Northern City: Toward a Northern Urban Vision."

LEMAN PARTNERS ARCHITECTS & ENGINEERS

13 Balmuto Street
Toronto, Ontario. M4Y 1W4
(416) 964-1833

Contact: Ingrid Leman

This firm practies architecture in the institutional, governmental and private commercial fields.

Projects include:

1. Massey Street Public School. Brampton, Ontario. Construction costs of $1.45 million funded by the Department of Education of the Province of Ontario and commissioned by the Peel Board of Education.

2. Settlers Green Public School. Meadowvale, Mississauga.

JAMES PALMER LEWIS

2 - 33 St. Mary's Road
Winnipeg, Manitoba. R2H 1H3
(204) 233-5336

Contact: James P. Lewis

The architect has designed a residence and studio building of low energy construction with solar assistance. The project is located near Keewatin, Ontario and was privately commissioned and funded. The consulting engineers on the project are G.H. Currie and Associates. Future projects include a low energy cottage in Clearwater Bay, Ontario.

## ARCHITECTURAL FIRMS (continued)

MICHAEL MILLER ARCHITECT
63 Yorkville Avenue, 3rd Fl.
Toronto, Ontario. M5R 1B7
(416) 968-0421

Michael Miller designs to normal insulation, heating, and cooling standards utilizing present technology such as heat pumps, insulated glazing, and passive solar heating.

MICHAEL C. OGUS ARCHITECT
417 Queens Quay West, Ste. 300
Toronto, Ontario. M5V 1A2
(416) 362-1177

The architectural firm specializes in energy conservation and management. Their designs have resulted in tremendous energy savings. Projects include the Ontario Ministry of Revenue building in Oshawa as well as other buildings in many areas of the world.

ROBERT L. PALEY ARCHITECT LTD.
14448 - 118 Avenue
Edmonton, Alberta. T5L 2M5
Contact: Mr. Robert Paley
(403) 453-6855

The firm offers design services for all types of buildings including interior design. The Merriweather computer program aids the firm in determining energy efficiency. Projects include a light industrial building and the J.K. Campbell Court House for the Government of Alberta.

ROBBIE ARCHITECTS PLANNERS
111 Merton Street, Suite 202
Toronto, Ontario. M4S 3A7
(416) 488-2382

The firm specializes in architectural, urban and civic design which is energy conserving. Projects have included:

1. Design of a high arctic energy conserving building in Frobisher Bay (1950).
2. Designed a building in Ottawa (1957) to reduce sun loads on A/C system through the use of sunshades
3. Received 1st prize in the LEBDA II new building category 1980.

ARCHITECTURAL FIRMS (continued)

**ROCKCLIFF PARTNERSHIPS**

10207 - 103 Avenue
Edmonton, Alberta. T5K 2V9
(403) 426-7412

Contact: David Schaeffer

The architectural firm is involved with the design of low to high rise residential and office units. They are currently involved in computer evaluation of energy consumption for single family dwellings.

**D.E. SCHAEFFER ARCHITECT LTD.**

11207 - 103 Avenue
Edmonton, Alberta. T5K 2V9
(403) 426-7414

Contact: David Schaeffer

Projects involved in include:

1. Passive solar residence in the Samson Band Indian Reservation for Lydia Yellowbird. Cost was approx. $80,000.
2. Lac La Biche Provincial Building, Lac La Biche, Alberta. A building of 8,000 sq. m., accommodating provincial offices, community health unit and court facilities, incorporating a passive solar collector mall and basement heat storage system.
   Also associated with this project was the Rockcliff Partnership, Architects/Planners.

**D. PERRY SHORT**

183 Brock Street
Sault Ste. Marie, Ontario.
(705) 949-5291

Contact: D. Perry Short

The firm has been involved in energy-efficient design. Projects include the Ville Ste. Marie Garden Homes which were submitted to the Low Energy Housing Demonstration Project (Ontario Ministry of Energy), and the Nanisivik project which is a housing development to house 20 single people (located in Baffin Island, N.W.T.). This project was not completed for monetary reasons.

## ARCHITECTURAL FIRMS (continued)

ZIPPAN AND BARRETT ARCHITECTS
55 City Centre Drive, Ste. 501
Mississauga, Ontario. L5B 1M3
(416) 279-6667

Contact: Stanley Zippan
Wayne Barrett

The firm specializes in the design and construction of residential, commercial, and industrial buildings from $60,000 to $10,000,000 in construction value.

Projects include:

1. A private residence located in Owen Sound consisting of passive solar and energy conserving techniques.
2. A passive solar heated retail facility located in Toronto.
3. Competed for Low Energy Building Design - Open competition for a commercial, retail and hotel complex.

ARCHITECTURAL FIRMS (United States)

**MILBURN-SPARN ENERGY ARCHITECTS INC.**

885 Arapahoe Avenue
Boulder, Colorado
U.S.A. 80302
(303) 447-2646

Contact: Mr. Ski Milburn

The firm is involved in the energy-efficient design of buildings using conventional and less-conventional means of conservation.

The firm's recent project was the design of an energy-efficient shopping center located in Grand Junction, Colorado. The project, named "Solaris Square" for the passive solar input, was completed in March 1981 at a cost of approximately $1 million. Solaris Square demonstrates the cost-effectiveness of computerized thermal and economic modelling techniques in the design process. The energy-conscious design features of Solar Square used to maximize energy conservation included high-efficiency lighting, solar collectors, insulation, HVAC system heat recovery, heat reclaim, thermal storage, etc.

## CONSULTING AND ENGINEERING FIRMS

**ACRES CONSULTING SERVICES LTD.**

480 University Avenue
Toronto, Ontario. M5G 1V2

The firm is involved in many areas of energy conservation. Recently, the firm's design entry into a Low Energy Building Design Competition sponsored by the Federal Government was selected as one of the award winning designs. The commercial design uses passive solar techniques for heating and direct ventilation for cooling. The design is partially underground to reduce heating and cooling demands. The report of the competition and awards of Low Energy Buildings is available from the Canadian Government Publishing, Centre of Supply and Services.

**AFFINITIES LTD.**

P.O. Box 5456
St. John's, Newfoundland.
A1C 5W4

The firm specializes in design and construction of energy-efficient residences.

**ALLEN-DRERUP-WHITE LTD.**

334 King Street East, Ste. 505
Toronto, Ontario. M5A 1K8
Contact: Lucille Frith
(416) 863-1762

The firm specializes in design, engineering, consultation, and construction of low energy buildings. They offer a range of residential design and construction services which include mechanical and building systems design, performance monitoring, and energy consulting. Recent projects have included:

1. Keewatin Demonstration Houses for N.W.T. Housing Corp.
2. Design and thermal analysis of demonstration houses for Ontario Hydro passive solar program.
3. Design and monitoring of various custom-built houses throughout Canada and the United States.
4. Retrofit design of several residences.
5. Consultation to various government agencies, architects and engineers, developers and individuals.
6. Industrial, commercial, and institution design.
7. Prototype design and development.

CONSULTING AND ENGINEERING FIRMS (continued)

**C. DAVID BAHRYNOWSKI & ASSOCIATES LTD.**

67 Mowat Avenue, Ste. 241
Toronto, Ontario. M6K 3E3

The firm has designed one energy-efficient structure - a family apartment housing project located in Elliot Lake, Ontario.

**PETER BARNARD ASSOCIATES**

111 Elizabeth Street
Toronto, Ontario. M5G 1P7
(416) 977-1544

Contact: Ms. Carolyn Kearns

The firm is an interdisciplinary firm specializing in management, marketing and planning. Projects which have been completed in the field of energy-efficient design are as follows:

Project inventory:

1. Climate Sensitive Residential Design for Energy-Efficiency in the Toronto Area. Involved in assessing the marketability of low energy/passive solar design modifications to conventional housing completed by Jerome Markson Architects. Prepared for the Project Planning Branch of the Ministry of Municipal Affairs and Housing. Completed in April 1982.
2. Recently submitted proposal to Ministry of Energy to investigate low energy/passive solar house design technologies and develop a strategy to encourage widespread implementation of these technologies.

**BRUYER CONSULTING GROUP**

10232 - 112 Street, Suite 200
Edmonton, Alberta. T5K 1M4
(403) 425-8820

Contact: Bill Bruyer

The firm offers energy design, land survey and consulting services. Projects have included one single family subdivision and a multi-family subdivision (Edmonton).

CONSULTING AND ENGINEERING FIRMS (continued)

CAMBRIAN ENGINEERING GROUP LTD.
2465 Cawthra Road
Mississauga, Ontario. L5A 3P2
Contact: Bernie Andrzejewski
(416) 272-1400

The firm provided on-site services to Kidd Creek Mines (Texasgulf) in Timmins over a period of ten years. The firm was involved in the design of mill buildings, maintenance shops and repair depots. They evaluated building configurations, wall insulation thicknesses, etc. to establish optimum designs.

Refer also to Sections 3.0, 6.0, 11.0, and 14.4 for further examples of the firm's energy interests.

CROSIER, KILGOUR & PARTNERS LTD.
550 - 330 St. Mary Avenue
Winnipeg, Manitoba. R3C 3Z5
Contact: Mr. T.C. Gibbs

The firm is comprised of consulting structural engineers who specialize in the design of structures in cold cities such as Winnipeg and Saskatoon. They have offices in Winnipeg, Calgary, Saskatoon, Edmonton, and Vancouver. Recently, buildings in Yellowknife, Churchill and Clyde River were designed by the firm.

ECOPLANS LIMITED
544 Conestogo Road
Waterloo, Ontario. N2L 4E2
(519) 884-7200

The firm has been involved in a community design project which utilizes topography and vegetation for wind and snow control, and for low maintenance landscapes.

ENERCON CONSULTANTS LTD.
1638 Hannon Bay
Regina, Saskatchewan. S4V 0S8
Contact: Leland Lange
(306) 585-0025

The consulting firm is involved in the comprehensive design and engineering of low energy structures and air management systems. As well, the firm engages in energy performance monitoring of buldings and consultation on the design of new and retrofit residential structures. Projects have included 100 houses from Montreal to the Yukon.

CONSULTING AND ENGINEERING FIRMS (continued)

FERGUSON, NAYLOR, SIMEK,
CLARK LTD.

4912 53rd Street, Box 1777
Yellowknife, N.W.T. X1A 2P4
(403) 920-2882

161 Eglinton Avenue E., # 702
Toronto, Ontario. M4P 1J7
(416) 484-4895

The firm is comprised of consulting engineers and architects involved with energy-efficient designs. Some of their projects include:

1. Computer Services Building located in Yellowknife, NWT. The structure was commissioned by the Government of the N.W.T. Also involved in this project were:

   A.M.E. Engineering Ltd., Electrical Engineers, Suite 700, 10160 - 112th Street, Edmonton, Alberta. T5K 1M3 and Morrison, Hershfield, Burgess & Huggins, Ltd., Structural Engineers, 3089 Bathurst Street, Toronto, Ontario. M6A 2A4

2. Lac La Martre Elementary School, N.W.T. Walter Dow & Co., Electrical Engineers, 2256 Lakeshore Boulevard W., Toronto, Ontario. M8V 1A9 and Marshall, Macklin, Monahan Ltd., Structural Engineering Division, Duncan Mill Road, Don Mills, Ontario were also involved in this project.

3. Pelly Bay Community Services Building, N.W.T.

GIFFELS ASSOCIATES LTD.

Contact: Mr. Carl Lehmann

30 International Boulevard
Rexdale, Ontario. M9W 5P3
(416) 675-5950

The engineers and planners of this firm deal in all types of industrial, commercial and institutional design projects. For further information, contact the firm.

PETER L.E. GOERING ARCHITECT

Contact: Peter Goering

36 Madison Avenue
Toronto, Ontario. M5R 2S1

The architect has been involved in several design proposals for work in the Arctic. These include:

cont....

CONSULTING AND ENGINEERING FIRMS (continued)

1. Design study of permanent land based accommodation for the Petro-Canada Arctic Pilot Project.
2. Lectured on "Design for the North" at a Symposium entitled Our Canadian North.
3. Attended U.N. Symposium on Human Settlements: Planning and Development in the Arctic.
4. Special consultant to Zeidler Parnership/Architects for the Nanisivik Town Centre project.
5. Preliminary design study for five Division Headquarters for the Polar Gas Project.
6. Design of multiple unit housing complex in N.W.T.
7. Design of a low rise office bulding emphasizing energy conservation strategies.
8. Lecturer at University of Toronto on Arctic Design.
9. Design and feasibility of an air curtain structure (offers weather protection).

HOUGH, STANSBURY + MICHALSKI LTD.
63 Galaxy Boulevard
Rexdale, Ontario. M5W 5R7
Contact: Mr. Michael Hough
(416) 675-6353

In 1979, this firm was requested to be part of a multi-disciplinary team headed by Robbie Williams Kassum Partnership, involved in the low energy building design competition in Regina. (Hotel Retail Office Category). The firm provided input regarding treatment and recycling of waste water and projection food materials for the hotel complex. A system of treatment tanks was developed which would produce algae for fish fodder. A full scale aqua-culture system which would operate on hydroponics and fish culture was designed to supply the hotel complex. In association with H.H. Angus Consulting Engineers and Scanada Consultants, building research.

IBI GROUP
156 Front Street West, 6th Fl.
Toronto, Ontario. M5J 2L6
Contact: Harold Katzin
(416) 596-1930

10009 - 108th Street, Suite 400
Edmonton, Alberta. T5J 3C5
Contact: David Thom
(403) 420-0101

The firm offers architectural and energy design services (only in Toronto and Calgary offices) and consulting services (offered only by Toronto office).

cont...

Projects include:

1. Energy Conserving Country Residence in Caledon, Ont.
2. Low Energy Building Design Awards Competition.
3. Several office buildings.

Refer also to Sections 1.0, 2.1, 2.2, 5.0, 8.4, 11.0, 14.3, and 14.4.

**INPRO ENGINEERING LTD.**

10339 - 124 Street, 6th Floor
Edmonton, Alberta. T5N 3W1
(403) 482-5661

Contact: Bowden Zackerson

The firm is involved in determining the most economic way to design a building for energy efficiency, feasibility studies, and financial analysis. Projects include a shopping centre, 250-room hotel, pilot industrial plant, and a school among others.

**INTERAGRO ENGINEERING LIMITED**

176 Janefield Avenue, Suite 288
Guelph, Ontario. N1G 2L6
(519) 836-5195 (evenings)

Contact: James B. Arnold

The firm specializes in agricultural engineering and energy conservation. A recent project completed was the energy-efficient design of a 2-storey private dwelling. The house featured super-insulation, forced-air electric heating, wood stove back-up heating, air-to-air heat exchanger, triple-glazed windows, dual hot water tank system, etc. The design and construction features are elements of Saskatchewan Housing Specifications for energy-efficient design. At present, project has not involved any assistance from the Ontario Government.

**LAMBTON ENGINEERING COMPANY LTD.**

1315 Exmouth Street
Sarnia, Ontario. N7R 3Y1
(519) 542-7713

Contact: Mr. G. Mak

Building designs at Lambton Engineering are based on the short or long term economy of the initial cost and of the operational cost of the building (type of construction, capacities of heating, cooling and ventilation, etc.).

Project inventory includes various institutional building, retail, commercial, light industrial and residential structures. Costs of project varied.

CONSULTING AND ENGINEERING FIRMS (continued)

MARSHALL MACKLIN MONAGHAN LIMITED

Contact: D.W. Beasley

275 Duncan Mill Road
Don Mills, Ontario. M3B 2Y1
(416) 449-2500

The consulting firm provides planning, engineering, economic, transportation and environmental services required for the preparation of energy conservation studies. The types of projects the firm is involved in is varied and includes:

1. Estimating energy consumption of new developments to assist planners and design professionals to estimate the total energy consumption of new development.
2. Climatic information for energy conscious planning to enable planners and architects to create a built environment which is responsive to climatic conditions, thereby reducing energy consumption.
3. Solar orientation, wind control and appropriate urban design for energy conservation.
4. Canadian Industry Energy Performance Measurement Manual
5. Development of a landscape theme for streetscaping in a large residential subdivision (Langmaid Meadows, Whitby).
6. Comprehensive Zoning By-laws project experience.
7. Integrated district heating system for Toronto combining four steam generating plants.
8. Energy management studies of Halton Court House, Peel Memorial Hospital, Dominion Public Building, Dryden Activity Complex, and Weston Collegiate Institute.
9. Supervisory Data Centre/Environmental and Security Control System.

MARWEST MANAGEMENT LTD.

Contact: P. Sanderson

1900 Winnipeg Square
360 Main Street
Winnipeg, Manitoba. R3C 3Z3
(204) 943-0591

The firm's real-estate interests encompass apartment, office, and townhouse complexes across North America.

The company has external professional energy advise in all building endeavours before and after construction. To-date their energy consultants are E.J. Faracii and Associates.

## CONSULTING AND ENGINEERING FIRMS (continued)

**MOFFAT ENGINEERING LTD.**

90 Eglinton Avenue East
Toronto, Ontario. M4P 2Y3
(416) 488-5522

The energy management consultants and consulting engineers are involved in building and systems research and design for energy conservation. Services offered by the firm include:

1. Energy Use Analysis of Audit.
2. Energy Conservation Opportunity Development.
3. Technical and Economic Feasibility Studies.
4. Off-Oil Conversion Studies.
5. Computer Analysis of Building Energy.
6. Design and Implementation of Retrofit Opportunities.
7. Energy Management Program Development.

The company has been involved in the analysis and retrofit on many recreational facilities in cold climates (located in many areas of Canada). The buildings have included Municipal swimming pools, arenas, libraries, community centres, etc. The projects have utilized various energy conservation technologies such as passive solar lighting, humidity control, conservation of latent heat to reduce energy usage, etc.

Conserval Engineering is a subsidiary of Moffat Engineering which is also associated with Paget Electronic Ltd. This firm develops and manufactures a variety of solid state conservation control systems.

**NEILL AND GUNTER LTD.**

Contact: Mr. D. Guest

P.O. Box 2190 East
Dartmouth, N.S. B2W 3Y2
(902) 434-7331

This consulting firm is involved in numerous energy conservation projects for both Canadian and U.S. companies, governments and schools. Since the list of projects is extensive, a general list of project topics will be given below:

1. Bark Burning Disposal.
2. Power and Steam Plant Studies.
3. Electrical Power Generation.
4. Energy Conservation Studies and Analysis.
5. Energy Audits.

## CONSULTING AND ENGINEERING FIRMS (continued)

JOHN W. RITTENGER AND ASSOCIATES
Consulting Engineers
106 Professional Building
Swift Current, Saskatchewan.
S9H 2B1
Contact: John. W. Rittenger
(306) 773-2901

The firm is involved in the design of industrial, commercial and institutional buildings. Projects have included an R.C.M.P. building, commercial and industrial structures, 10 to 15 single family dwellings per year, and numerous schools and churches. The firm also offers consulting services such as feasibility studies. Examples of this type of project include renovations of schools in southwestern Saskatchewan and an industrial building in Kindersley.

R.P.A. CONSULTANTS LIMITED
400 Mount Pleasant Road
Toronto, Ontario. M4S 2L6
Contact: J.K. Tattersall

Refer to Section 11.0 for a detailed description of the services and projects offered by the firm.

KARL STEVENS AND ASSOCIATES
1 St. Clair Avenue West
Toronto, Ontario.
(416) 961-5690

Project inventory includes design of a Community Hall in Tuktoyaktuk, N.W.T. (preliminary phase).

See Section 15.0 for other projects conducted by the firm.

THAMES VALLEY ENGINEERING INC.
392 Park Avenue East, No. 100
East Park Place
Chatham, Ontario. N7M 5Y5
Contact: M. W. Elzinga
(519) 354-2193

The firm is composed of civil and municipal engineers, subdivision planners, building designers, and municipal drain specialists.

The firm was involved in designing a residential house using the most recent energy conservation techniques. The house, located in the City of Chatham, was funded by the Ministry of Energy through the Housing and Urban Development Association of Canada (HUDAC) at a cost of $60,000. The project is being monitored by Union Gas in Chatham for actual gas consumption for heating.

## DEVELOPMENT AND CONSTRUCTION COMPANIES

**CHAMPLAIN HEIGHTS DEVELOPMENT GROUP**

404 - 515 West 10th Avenue
Vancouver, British Columbia.
V5Z 4A8

Contact: Mr. R.J. Moodie

The development group is a Vancouver-based company involved in developing the city's new residential subdivision. Called the "Solar West Project", Phase 1 was begun in 1979. The development group recommended site planning principles to maximize passive solar gains for each house in the subdivision and directed the building forms that minimized heat loss be used. Houses contain energy conservation aspects such as double-glazed, south-facing, shuttered windows, high levels of insulation and foundation insulation, and tightening, (ie., weatherstipping, caulking, vapour-barriers and air locks).

Completed, "Basic Guidelines for Energy Conservation in Community Planning and Building Design." Vancouver: The City, 1979.

**ENCOTECH ENERGY SYSTEMS LTD.**

10062 - 80 Avenue
Edmonton, Alberta. T6E 1T5
(403) 432-1086

Contact: Chris Bamford

The firm modifies design plans for energy efficiency as well as offering residential consulting services on site to locate energy wastings. These types of services have been performed on several homes in the Edmonton area.

The firm also supplies air-to-air heat exchangers, vapour barrier components, solar heating equipment, radiant heating systems, set-back thermostats, wood stoves, water conservation hardware, and miscellaneous caulking/sealing materials.

**ENERHOME DEVELOPMENTS LTD.**

118212 - 123rd Street, Ste. 102
Edmonton, Alberta. T5L 0G7
(403) 454-0728

Contact: Pat Preston

The firm provides a complete design package with emphasis on energy conservation. Projects have included one house in the 1981 HUDAC Parade of Homes, and 3 low-rise apartment projects.

## DEVELOPMENT AND CONSTRUCTION COMPANIES (continued)

ENGINEERED HOMES LTD.
340 - 50 Avenue S.E.
Calgary, Alberta. T2G 2B1
Contact: Grant McNeill
(403) 243-6681

The firm offers design and construction services. All designs are energy conserving with full air management. Projects have included:

1. The design of an energy-efficient home for HUDAC Parade of Homes.
2. Construction of 850 units in 1981 comprising of single family dwellings, apartment complexes, and low rise.

HILTON HOMES LTD.
501 - 45 Street West
Saskatoon, Sask. S7L 5Z9
Contact: Bill Anderson
(306) 244-4410

The company provides energy-efficient construction services mainly for low rise residential structures.

LINCOLNBERG HOMES
4656A - 99 Street
Edmonton, Alberta.
Contact: Larry Anderson
(403) 437-0166

The firm offers complete design services in architectural and energy-efficient design as well as design and construction consulting services, financial and economic analysis, general contracting, and feasibility studies.

Projects have included 25 to 30 energy-efficient homes (two of the homes won 1st and 2nd prize in HUDAC's Parade of Homes).

SEAMAN & SONS CUSTOM BUILDERS
P.O. Box 501
Southampton, Ontario. N0H 2L0

This company specializes in construction of energy-efficient custom-built residential homes. Procedures used include: insulation of exterior walls (2x6" studs) with R-20 batts, blown-in rockwool (R-40) in ceilings, R-20 batts in floors, double-glazed windows (triple-glaze too expensive for the minimal advantage they offer), foam-filled insulated doors and baseboard electric heating systems, some with heat pumps.

## DEVELOPMENT AND CONSTRUCTION COMPANIES (continued)

**ENGINEERED HOMES LTD.**
340 - 50 Avenue S.E.
Calgary, Alberta. T2G 2B1
Contact: Grant McNeill
(403) 243-6681

The firm offers design and construction services. All designs are energy conserving with full air management. Projects have included:

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# SECTION 14.2

# PRODUCTS

## ARCHITECTURAL FIRMS

**EDWARD R. BALDWIN ARCHITECT**

167 Richmond Street East
Toronto, Ontario. M5A 1N9
(416) 364-4521

Contact: E.R. Baldwin

The firm is interested in cold climate designs and research of products useful in architectural applications.

FRP Panel System. A cladding system using foam core fibre-reinforced plastic faced panels for use in cold climate construction. The system was designed for and with Fibrecraft Canada Ltd. in 1980. Prototype panels were manufactured for use on a Loblaws supermarket.

Operable Enclosures. A prototype retractable wall and roof enclosure for swimming pools, restaurants, courtyards and other applications, which can be fully retracted leaving no evidence of structure or the enclosure. This enclosure, at an estimated cost of $75,000 to design and build, can promote outdoor living during seasons when it is normally impractical. The project is currently in the preliminary design phase.

Thermal Shutters. In consultation with Sentinel Aluminum Co. Ltd., thermal shutters for protection of glazed openings are presently being researched and designed.

For other projects, see Section 18.0.

## MANUFACTURING FIRMS

**W.R. GRACE & CO. OF CANADA LTD.**

294 Clements Road West
Ajax, Ontario. L1S 3C6
(416) 683-8561

Contact: George Alexiou

The Construction Products Division of the firm has designed the following energy-efficient products:

1. Polycel One - is a single component urethane foam sealant that stops air infiltration.
2. Zonolite - vermiculite attic insulation and masonry fill insulation.

## MANUFACTURING FIRMS (United States)

**WEATHERSHIELD MANUFACTURING INC.**

P.O. Box 309
Medford, Wisconsin
U.S.A. 54451
(715) 748-2100

The firm manufactures WeatherShield Energy-Efficient Wood Windows. Their product line includes hinged and sliding patio door, insulated entrance systems, and triple and quadruple-glazed passive solar windows which use SunGain window film, an insulating product from the 3M Company, Technology Enterprises Division, 53-5 3M Centre, St. Paul, Minnesota. 55144.

## EQUIPMENT AND SUPPLY FIRMS (United States)

**THE ENERGY GROUP INC.**

P.O. Box 3317
Annapolis, Maryland.
U.S.A. 21403
(301) 263-4414

Contact: R.L. Hoddinott

The firm is an international marketing company of energy conservation products. Currently, the firm is marketing a product called the POWER PHASER. When installed between the power supply and motor, the Power Phaser reduces the electric bill by as much as 30 to 50%.

**IMC INSTRUMENTS INC.**

6659 North Sidney Place
Glendale, WI. U.S.A. 53209
(414) 352-3810

The firm is an American company which specializes in the distribution of digital thermometers and temperature monitoring panels.

Other products include:

1. Cold junction compensator.
2. Surface temperature probes.
3. Wide range digital thermometers.
4. Relative humidity calculator.

## EQUIPMENT AND SUPPLY FIRMS (United States)

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4. Relative humidity calculator.

GOVERNMENT (FEDERAL)

| | |
|---|---|
| DEPARTMENT OF INDIAN AND<br>NORTHERN AFFAIRS | Buildings Division<br>Technical Services<br>Ottawa, Ontario. |
| Contact: Mr. R. Chill | (613) 997-0337 |

In May of 1982, the Department of Indian and Northern Affairs completed a research study on northern housing construction. Entitled, "Design Guidelines and Technology for Northern Housing Construction", the project and final publication provide design guidelines for housing in permafrost zones and regions of severe winter climate. Materials and methods suitable for these regions are mentioned, as well as energy conservation measures, the problems that can occur with their use and recommendation to avoid or correct these problems.

# SECTION 14.3

# CONSTRUCTION

## CONSULTING AND ENGINEERING FIRMS

IBI GROUP

156 Front Street West, 6th Fl.
Toronto, Ontario. M5J 2L6
(416) 596-1930

Contact: Harold J. Katzin

Projects include:

1. Improving Housing Construction in Small Communities. This study was conducted across Canada.
2. Builder's Guide to Energy Efficiency in New Housing prepared for HUDAC and the Ontario Ministry of Energy.

Refer also to Sections 1.0, 2.1, 2.2, 5.0, 8.4, 11.0, 14.1, and 14.4.

## DEVELOPMENT AND CONSTRUCTION COMPANIES

BRANTFORD CONSTRUCTION
Box 6, Site 13, R.R. #5
Edmonton, Alberta. T5P 4B7
Contact: Garth Ford
(403) 470-0021

This general contracting firm has constructed 5 single family dwellings which utilize energy-efficient strategies.

CAIRNS HOMES LTD.
1323 - 44 Avenue N.E., No. 1
Calgary, Alberta. T2E 6L5
Contact: Bill Fennell
(403) 276-9291

This company provides general contracting, land development and research services. The firm has constructed and developed 300 single family dwellings and has researched one project for HUDAC's Parade of Homes.

EQUITY DEVELOPMENT GROUP INC.
245 Fairview Mall Dr., Ste. 309
Willowdale, Ontario. M3J 4T1
Contact: D.F.A. Fleming

The land development firm has developed the heathwood project for Heron Homes Ltd. The project is an energy-efficient single family subdivision. The homes use heat pumps, upgraded insulation, and special vapour barriers.

VICEROY HOMES
2220 Dundas Street East
Mississauga, Ontario.
(416) 279-2163

Builders of energy-efficient recreational and residential homes. Vieroy homes contain an insulated roof/truss system which stops 12-15% of heat loss through the roof, triple-glaze windows and sliding doors, etc. These energy-efficient features make Viceroy homes "the most energy-efficient in America."

DEVELOPMENT AND CONSTRUCTION COMPANIES (continued)

GEORGE WIMPEY CANADA LIMITED

80 North Queen Street
Toronto, Ontario. M8Z 2C9
(416) 233-5811

Contact: George Jacobs

The firm has designed and constructed a single family residential unit located in Mississauga. The structure was funded by the Ontario Ministry of Energy and HUDAC. Other individuals involved in the project were the firms of Beinhaker, Irwin Associates and Harold J. Katzin Associate providing mechanical design.

DEVELOPMENT AND CONSTRUCTION COMPANIES (continued)

GEORGE WIMPEY CANADA LIMITED

80 North Queen Street
Toronto, Ontario. M8Z 2C9
(416) 233-5811

Contact: George Jacobs

The firm has designed and constructed a single family residential unit located in Mississauga. The structure was funded by the Ontario Ministry of Energy and HUDAC. Other individuals involved in the project were the firms of Beinhaker, Irwin Associates and Harold J. Katzin Associate providing mechanical design.

## GOVERNMENT (FEDERAL)

### AGRICULTURE CANADA

Engineering and Statistical
Research Institute
930 Carling Avenue
Ottawa, Ontario.
(613) 995-3151

Contact: M. Feldman

The work carried out under a grant from the NRC's Solar Energy Program, involved research and development on solar energy systems as applied to the Canadian agricultural and food sector. The four areas under which studies were carried out were:

1. Greenhouse heating
2. Ventilation air preheating for livestock buildings
3. Crop drying
4. Food processing.

Research and development consisted of prototype testing and evaluation, field trials, information dissemination and technical support for demonstration projects.

# SECTION 14.4

# RESEARCH

## RESEARCH INSTITUTIONS

### UNIVERSITY OF CALGARY

2500 University Drive N.W.
Calgary, Alberta. T2N 1N4
(403) 284-5731

Contact: Dr. G. Walker

Dr. Walker is involved with "cold climate" and "energy-related" research in the area of energy efficiency, energy management in buildings, and stirling engines.

Refer also to Sections 4.4, 2.4 and 11.0 for more information on the university's research endeavours.

### UNIVERSITY OF MANITOBA

Winnipeg, Manitoba.

The university has conducted testing programs in the area of energy efficiency in homes located in cold climates.

### UNIVERSITY OF REGINA

Regina, Saskatchewan.

The university has conducted an intensive testing program for energy efficiency in homes located in cold climates, plus the use of solar energy to heat buildings.

### ROYAL MILITARY COLLEGE OF CANADA

Dept. of Mechanical Engineering
Kingston, Ontario. K7L 2W3
(613) 545-7369

Contact: Dr. W.C. Moffatt

The College is involved with energy conservation research with respect to naval vessel propulsion systems and steam raising using gas turbine exhaust gases.

RESEARCH INSTITUTIONS (continued)

UNIVERSITY OF WATERLOO

Office of Research
Waterloo, Ontario. N2L 3G1
(519) 885-1211

Contact: E.L. Holmes

The university's Office of Research is currently undertaking the following research:

1. Energy Conservation in the Warehouse and Light Industrial Building Category. The Project Co-ordinator is Dr. E.F.P. Burnett and the funding organization is Energy Mines and Resources Canada (Building Technology Support Program).

2. Numerous projects under the Civil and Mechanical Engineering Departments funded by both government and private agencies. For further detail contact: Dr. E.F.P. Burnett (Civil Engineering) or Dr. H.F. Sullivan (Mechanical Engineering).

## CONSULTING AND ENGINEERING FIRMS

**CAMBRIAN ENGINEERING GROUP INC.**

Contact: Bernie Andrzejewski

2465 Cawthra Road
Mississauga, Ontario. L5A 3P2
(416) 272-1400

The firm is involved in the following projects:

1. A preliminary study of an office building situated in northern Ontario was made resulting in a 45% reduction in energy consumption with no reduction in comfort standards and no significant capital expenditure.
2. Investigative work in electrical energy management for multi-unit residential buildings carried out for the Ontario Ministry of Energy.

Refer also to Section 3.0, 6.0, 11.0 and 14.1.

**CURRIE, COOPERS AND LYBRAND**

Contact: Nancy Pinnington

145 King Street West
Toronto, Ontario. M5H 1J8
(416) 366-1921

The management consulting firm undertook a study for the Ontario Ministry of Municipal Affairs and Housing to identify current energy conservation difficulties connected with rent controls and the rent review process, and prepared alternative approaches which would encourage energy conservation by landlords.

The firm is also engaged in other areas of energy research. Refer to Sections 5.0, 6.0 and 18.0.

**IBI GROUP**

Contact: Harold J. Katzin

156 Front Street West, 6th Fl.
Toronto, Ontario. M5J 2L6
(416) 596-1930

Projects include:

1. Assistance in a post-evaluation of the Federal Government Program to conserve energy within its own operation. Prepared report for the Office of the Auditor General.
2. Preparation of a text aimed at buyers of new homes entitled "Buying Your Energy-Efficient New Home."

Refer also to Sections 1.0, 2.1, 2.2, 5.0, 8.4, 11.0, 14.1, and 14.3.

## PROFESSIONAL ASSOCIATIONS

AMERICAN SOCIETY OF HEATING
REFRIGERATION AND
AIR-CONDITIONING ENGINEERS

1791 Tullie Circle, N.E.
Atlanta, Georgia.
U.S.A. 30329
(404) 636-8400

Contact: J. Richard Wright

Projects conducted in this area of research include:

1. Control strategies for minimum energy use conducted by Duke University. The purpose of the project is to determine how to coordinate the controllable parameters in a HVAC system to meet the requirements of the system with a minimum of energy use or cost.
2. The effect of radiant cooling panels on temperature stratification in industrial plants conducted by Wayne State University.

Refer to Sections 2.4 and 6.0 for examples of other current research projects sponsored by A.S.H.R.A.E.

## PROFESSIONAL ASSOCIATIONS

AMERICAN SOCIETY OF HEATING
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Refer to Sections 2.4 and 6.0 for examples of other current research projects sponsored by A.S.H.R.A.E.

## GOVERNMENT (PROVINCIAL/STATE)

**PROVINCE OF NEW BRUNSWICK**

Contact: Creighton Aquin

School Buildings Branch
Department of Education
P.O. Box 6000
Fredericton, N.B. E3B 5H1
(506) 453-2869

The Department of Education has an extensive maintenance and retrofit program where heavy energy conservation concentration exists (with particular emphasis on window replacements).

**IOWA ENERGY POLICY COUNCIL**

Lucas Building, 6th Floor
State Capitol Office Com.
Des Moines, Iowa. U.S.A. 50319
(515) 281-4420

Currently involved in state policy on energy, promotion of conservation, and alternative energy production. Future research includes an innovative design for energy affordable living to be called "Iowa's Ideal Homes."

Current projects are as follows:

1. State Energy Conservation Plan
2. Passive Solar Program
3. Energy audits of, and grants to schools, hospitals, and local government agencies.

# SECTION 15.0

# LEGISLATION AND OFFICIAL PLANS

GOVERNMENT (MUNICIPAL)

CORPORATION OF CITY OF CAMBRIDGE

73 Water Street N., Box 669
Cambridge, Ontario. N1R 5W8
(519) 623-1340

Recently restructured Official Plan to include sections on energy conservation.
Includes such aspects as "encouraging energy-efficient residential subdivision design."

CITY OF EDMONTON

13th Fl., Phipps McKinnon Bldg.
10020 - 101A Avenue
Edmonton, Alberta. T5J 3G2

Contact: Don Hussey

The city's Energy Management Committee co-ordinates the city's energy conservation program to reduce energy use in municipal buildings and in all areas of the city's operation. The City of Edmonton carries out energy conservation and demonstration programs in the building-related, transportation, education, planning, and land-use access.

Their general Municipal Plan energy conservation policies encourage increased residential densities and construction of downtown core, housing to decrease transportation energy use, protect solar access and solar orientation of new subdivisions, maintain handbook of design guidelines, increase retrofit building standards/weatherization, provide loans/grants for retrofit, information dissemination, etc.

The City of Edmonton is involved in the following projects:

1. Energy audits, weatherization and retrofits.
2. District heating, building orientation, street lighting and landscaping.
3. Employee training/seminars.
4. Recycling.
5. Parking policy changes and transit improvements.
6. Performance standards and monitoring, solartech demonstration, conserver ethic, and public information/involvement.

CITY OF KANATA

Contact: D. Krajaefski

150 Katimavik Road
Kanata, Ontario. K2L 2N3
(613) 592-4281

In 1978, Kanata's Council approved the Secondary Plan for the Town Centre Community of Kanata. The document describes the intended pattern of land use in the Town Centre and is lavish in the policy descriptions of how micro-climates may be influenced or taken advantage of by the construction of Town Centre buildings, how circulation space for the various modes of transportation should be separate or interact and how building form can positively influence the "habitability" of an urbanizing city core area. Since winter is the most stressful season, many policy statements specifically address the rigours of winter climate. This Official Plan amendment was carried out with the assistance of a grant from the Federation of Canadian Municipalities whose Municipal Research Support Program was funded by the Ministry of State for Urban Affairs.

CITY OF THUNDER BAY

Contact: Mr. Lyn Rose

Public Works Department
Maintenance Division
570 Fort William Road
Thunder Bay, Ontario. P7B 3A1
(807) 623-2711 ext. 2830

In 1978, the City Council approved the formation of the Energy Conservation Committee to implement, maintain, and assess non-monetary energy conservation measures, (i.e. turning off lights) in all city buildings. The Committee's work extended to creating a plan to maintain lower lighting levels, constant temperatures of 70 degrees F and temperatures of 55 degrees F in storage areas, and to reduce consumption levels in City vehicles by 5%. Capital cost measures of saving energy which require initial installation costs and have a relatively short payback period are being investigated. In the future, installation of thermopane windows in City-owned buildings and installation of an "on-line" hot water heater in the Police Station will be priorities.

CORPORATION OF CITY OF WINDSOR

Contact: Mr. R. Atkins

Department of Planning
Room 400, City Hall
Windsor, Ontario. N9A 6S1
(519) 255-6281

Research projects include:

1. Windsor Study-Energy Conservation Through Land Use Planning: A major study to establish urban planning policies and practices to conserve energy in the City of Windsor.

Study under preparation, jointly by the Department of Planning, Windsor and consultant M.M. Dillon, Toronto. Partially funded by a grant from the Ministry of Municipal Affairs and Housing.
Expected completion date is the summer of 1983.

Mr. R. Varma and Bob Hayes were the principal researchers.

For further studies, see Section 14.1.

## CONSULTING AND ENGINEERING FIRMS

**PETER BARNARD ASSOCIATES**

111 Elizabeth Street
Toronto, Ontario. M5G 1P7
(416) 977-1544

Contact: Ms. Carolyn Kearns

The firm is an interdisciplinary firm specializing in management, marketing and planning. Projects which have been completed in the field of energy conservation legislation are as follows:

1. Georgina Township, York Region Energy Conservation and Land Use Planning Study. A review of Municipal planning documents to assess their sensitivity to energy conservation. Recommendations for changes to Official Plan and Zoning By-laws to promote and provide for more energy conserving development. A handbook for Georgina Twp. homeowners and builders will be produced to encourage and assist in energy sensitive design. Funded by the Energy Conservation Through Land Use Planning Grant Program of the Ministry of Municipal Affairs and Housing at $26,000.

See Section 14.1 for other projects.

**A.J. DIAMOND PLANNERS LTD.**

322 King Street West
Toronto, Ontario. M5V 1J4
(416) 977-2422

Contact: Kevin Garland

The planning firm has produced a manual on the use of zoning to protect solar access for residential development (for both new and existing development) in Ontario. This project was commissioned by the Ontario Ministry of Energy and the final publication will be undertaken by Coopers and Lybrand as part of a larger series of energy studies.

**DILLON CONSULTING ENGINEERS/PLANNERS**

47 Sheppard Avenue East
Willowdale, Ontario.
(416) 229-4646

Contact: Mr. Daniel Paquette

The firm is involved with many aspects of energy-efficient designs. Examples of project include the following:

1. Energy Study, City of Sault Ste. Marie: Incorporation of energy conservation principles into the city's Official Plan.

cont....

CONSULTING AND ENGINEERING FIRMS (continued)

2. Land Use Plan energy considerations for use in the Official Plan update for the City of Guelph. Done in conjunction with Landplan Collaborative Ltd., Landscape Architects, Land Planning. 128 Woolwich Street, # 204, Guelph, Ontario. N1H 3V2

See Sections: 1.0, 2.1, 3.0, 4.1, 6.0, 8.0, 11.0, 18.0, and 19.0.

KARL STEVENS AND ASSOCIATES

1 St. Clair Avenue West
Toronto, Ontario.
(416) 961-5690

Project inventory:

1. The firm is involved in the urban design component for the General Plan revision for Yellowknife, N.W.T. Also associated with this project are C.P.M. Consultants of Edmonton, Alberta.
2. Community Plan for Tuktoyaktuk, N.W.T., in association with the G.N.W.T.
3. Community Plan for Norman Wells, N.W.T., in association with the G.N.W.T.

## ARCHITECTURAL FIRMS

**THE LANDPLAN COLLABORATIVE LTD.**

128 Woolwich Street, Suite 204
Guelph, Ontario. N1H 3V2

The firm specializes in site design for energy conservation, microclimatic analyses for design, snow and wind consideration for design, land management techniques, low maintenance and energy consumption landscapes, and resource planning.

The firm has conducted a land use plan energy considerations for use in the Official Plans for the City of Guelph.

Refer also to Section 1.0 for more information on the firm's projects.

## ARCHITECTURAL FIRMS

**THE LANDPLAN COLLABORATIVE LTD.**

128 Woolwich Street, Suite 204
Guelph, Ontario. N1H 3V2

The firm specializes in site design for energy conservation, microclimatic analyses for design, snow and wind consideration for design, land management techniques, low maintenance and energy consumption landscapes, and resource planning.

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Refer also to Section 1.0 for more information on the firm's projects.

GOVERNMENT (FEDERAL)

ENERGY MINES AND RESOURCES CANADA

Conserv. & Renewable Energy Br.
580 Booth Street
Ottawa, Ontario. K1A 0E4
(613) 995-9447

The Energy Conservation and Renewable Energy Branch of EMR offers the Forest Industry Renewable Energy (FIRE - EMR 47) program. This is a capital cost-sharing program to encourage the substitution of such biomass fuels as wood, municipal waste, peat and agricultural products for purchased energy. Financial incentives are provided to convert existing facilities or to install new facilities, utilizing biomass fuels, and thus reducing dependence on non-renewable resources.

# SECTION 16.0

# BIOMASS AND GEOTHERMAL

GOVERNMENT (PROVINCIAL/STATE)

NORTHWEST TERRITORIES
GOVERNMENT SERVICES

Contact: J.A. Severn

Energy Conservation Division
Government of the N.W.T.
Yellowknife, N.W.T. X1A 2L9
Telex: 034-45531

This department is sponsoring a Canada/Northwest Territories Conservation and Renewable Energy Demonstration Program.

Project Inventory:

Generation of electricity from wood, this project demonstrates the feasibility of an automated wood gasification plant as the supplier of power and heat to a 37,000 sq. foot complex (Snowshoe Inn, Fort Providence, N.W.T.). Wood gas from the gasifier will fuel the engine which in turn will power the 120 kW generator. The jacket heat from the engine radiator as well as the exhaust heat will be recaptured for community heating.

STATE OF ALASKA DIVISION OF ENERGY AND POWER DEVELOPMENT

Contact: Mr. Steve Baden

338 Denali
7th Floor, MacKay Building
Anchorage, AL. U.S.A. 99501
(907) 276-0508

The Alaska Division of Energy and Power Development's primary concern is the development, management and efficient use of Alaska's energy resources and the conservation of energy.

Project Inventory:

1. Pilgram Hot Springs Geothermal Development Program. With funds appropriated by the Alaska Legislature, the Division has conducted an exploration program at Pilgram Hot Springs, located 60 miles north of Nome. Shallow drilling indicates a promising direct use of the geothermal resource and a more comprehensive drilling program will identify and confirm the geothermal potential of the area.
2. The Geophysical Institute will design, install and test heat pump system that will use the earth as a heat source.
3. Lime Village Cogeneration.
   The Division has contracted with the community of Lime Village, located on the Stony River in interior Alaska, to install a small wood gasification generator to power a refrigeration unit.

cont....

GOVERNMENT (PROVINCIAL/STATE) continued

4. AVEC Wood Gasification Project.
   The development of a wood, biomass and coal gasification system for use with existing diesel generators was funded in 1979. In 1981, the second phase was carried out to include endurance and efficiency tests by the Alaska Village Electric Cooperative (AVEC) in Anchorage. The Division is developing a prototype gasifier which will be located in Petersburg in the fall of 1982, based upon the results of the AVEC study.
5. Alaskan Peat Assessment Project.
   Almost 27 million acres of peat exist outside the permafrost range in Alaska. The Division is involved in determining the use of peat as an energy resource for Alaska. Field assessments and finally peat resource map were completed and published in 1982.
6. Dillingham Peat Farm Demonstration.
   The Division and the Bristol Bay Native Association have begun work associated with developing a peat harvesting operation in Dillingham. The peat harvested would be used for direct residential heating in rural communities.
7. Southcentral Peat Commercialization Feasibility Study.

## RESEARCH INSTITUTIONS

UNIVERSITY OF ALBERTA Edmonton, Alberta. T6G 2G8

Contact: Dr. F.W. Jones

The following project was funded by the Alberta/Canada Energy Resources Research Fund, a joint effort of the Department of Energy and Natural Resources, Alberta and EMR, Canada.

Investigation of Geothermal Energy Resources of Alberta.

INSTITUTE OF MAN AND RESOURCES
49 Dorval Street
Charlottetown, P.E.I. C1A 1A4
Contact: Mr. Dave Murray
(902) 892-0361

The institute's orientation is one of research, development and demonstration. The following is an example of the type of demonstration projects the institute is involved in.

1. Thirty wood chip gasifiers and 26 stoker-fired furnaces modified to burn wood pellets were installed in private residences in P.E.I., to demonstrate their efficiency and to assist in the development of a market base for wood chip and pellet fuel. Total cost of the project which runs from 1980 to 1983, is $584,986.00 funded by EMR, Canada.

2. Seven different coal stoker units were modified to burn wood pellets and tested for thermal performance emission levels. Viability for local manufacture was also investigated. This testing project cost $62,543.00 funded by EMR, Canada.

For more projects, see Sections 2.2, 2.4 and 5.0.

## RESEARCH INSTITUTIONS (United States)

UNIVERSITY OF ALASKA

Contact: Professor T. Neil Davis

901 Kayukuk Avenue S., Room 10
Arctic Health Building
Fairbanks, Alaska.
U.S.A. 99701

Research is underway to determine the potential for geothermal energy from hot springs, the many Alaskan volcanoes, and from regions of abnormally high temperature gradients existing in certain parts of the State. The extent of the hot springs and other geothermal resources in several parts of Alaska, developing improved techniques for exploration, and examining economic factors in the use of this resource, particularly for small-scale rural applications.

## CONSULTING AND ENGINEERING FIRMS

### B.H. LEVELTON & ASSOCIATES LTD.

The following project was funded by the Alberta/Canada Energy Resources Research Fund, a joint venture of the Alberta Department of Energy and Natural Resources and EMR, Canada.

Energy from wood waste (sawmill residues). The objective was to evaluate all existing and proposed systems suitable for converting sawmill residues into usable forms of energy with an emphasis on gasification. Two gasifiers and one wood-fired boiler system were economically viable over the lifespan of the equipment, provided surplus electricity was sold for at least $0.01/kWh. The natural gas price for the Alberta Sawmill industry, currently between $1.01 and $1.63/mcf, must approach $2.00/mcf before energy derived from sawmill residue, which is free, can compete favourably with natural gas.

### NOVAMETRIC ENGINEERING

Box 8163, 222 Cardinal Crescent
Saskatoon, Sask. S7K 6C4
(306) 373-4965

Contact: Allan Bens

The firm is involved in the design of commercial, industrial and scientific instrumentation. The firm also offers design services in the areas of electronics and energy-related activities, and consulting services on energy-efficient design. Projects have included:

1. Use of geothermal energy combined with conventional energy sources for the University of Regina.
2. Passive solar convective loop houses.
3. Wind energy engineering study for High Arctic.
4. Energy analysis for house in Show Case project.
5. Energy audit for University of Regina campus based solely on energy conservation.

## CONSULTING AND ENGINEERING FIRMS

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GOVERNMENT (FEDERAL)

ENVIRONMENT CANADA

Atmospheric Environment Service
4905 Dufferin Street
Toronto, Ontario. M3H 5T4
(416) 667-4614

AES under Environment Canada's EM 2 program provides climate application. The Canadian Climate centre is responsible for analysis and interpretation of climatic data. This data is used for assessment of the impact of climate on national concerns such as agricultural production, industrial design, Arctic development and transportation, wind and solar energy, recreation and tourism, and for the provision of information and consultation services to users concerned with policy, planning and design, forest management and human health.

# SECTION 17.0

# CLIMATOLOGY

## RESEARCH INSTITUTIONS

### UNIVERSITY OF ALBERTA

Dept. of Mechanical Engineering
Edmonton, Alberta. T6G 2G8

Contact: Dr. J.D. Dale
Dr. T.W. Forest

The University is engaged in a project on Cold Region Heat Transfer involving various convective heat transfer problems with solidification. The temperature field in the solified region will be used to determine the local heat transfer coefficient at the solid-liquid interface.

Other areas of research are also undertaken by the University. Refer to Sections 2.4, 4.4, 6.0 and 16.0.

### LAVAL UNIVERSITY

Department of Physiology
School of Medicine
Quebec City, Quebec.

Contact: Dr. J. LeBlanc

Research is being conducted on the ability of human subjects to acclimatize themselves to the cold and is funded by the Department of Supply of the Medical Research Council.

### UNIVERSITY OF MANITOBA

Civil Engineering Department
Winnipeg, Manitoba. R3T 2N2
(204) 474-9220

Contact: J.I. Glanville

The university is involved in research on the structural implications of climatic temperature extremes in masonry buildings. The research is funded by the Canadian Masonry Research Foundation and N.S.E.R.C.

RESEARCH INSTITUTIONS (United States)

SOLAR ENERGY RESEARCH INSTITUTE (SERI)

Contact: Kerri C. Hunter

1617 Cole Boulevard
Golden, Colorado.
U.S.A. 80401
(303) 231-1000

The institute is a division of the Midwest Research Institute. It has chapters across the United States and Canada.

Project Inventory:

1. The institute is involved in daylighting research. Daylighting theory is studied in the SERI labs with respect to the particular daylight conditions in the U.S. Experiments are performed on the integration of daylighting with other passive and conventional energy strategies for heating, cooling and lighting buildings. Sunlight availability data is generated, based on the computed probability of having sunshine in a given hour or for a specific duration of time.

2. Future work includes advanced daylighting systems studies, integrated systems research, (daylighting integrated with electric lighting and conventional HVAC systems), daylighting glazing materials research, further analysis of flux mappers and development of computer algorithms.

## RESEARCH INSTITUTIONS (Foreign)

BUILDING RESEARCH ESTABLISHMENT

Contact: Dr. D.J. Fisk
Head of Mech. and Elec.
Engineering Division

Department of the Environment
Building Research Station
Garston, Watford
ENGLAND. WD2 7JR
(0927 3) 74040 ext. 7151

The majority of the BRE Research Program supports the Department of the Environment in its policy responsibilities for housing, energy conservation and environmental protection.

Project inventory:

1. Climatic data for design and building. Objectives of the study are: To review climatic data for building design and construction so that data needs and availability can be more effectively matched. To analyze the ways in which data are used in different fields, identify possible benefits from harmonizing practices and improve the coverage and usefulness of published data. To develop knowledge about climatic effects on particular aspects of design and construction operations; for design, the principle objective is to review data needs, e.g. for local climate and microclimate effects; for construction, the need is to validate tentative conclusions about weather interference with and damage to work under construction e.g. rain and frost correlated with ground conditions for earthworking.

For other projects, see Sections 2.4, 3.0, 5.0, 8.4, 10.0, and 11.0.

INSTITUT ROYAL METEOROLOGIEQUE
DE BELIGIQUE

Avenue Circulaire 3
B - 1180, Brussels
BELGIUM.

Contact: R. Dogniaux

The institute is currently producing meteorological data of weather station reports for station in Belgium, France, Ireland, Germany, Denmark, The Netherlands, and Great Britain. This data will then be processed for solar energy applications (on a comparison basis).

ARCHITECTURAL FIRMS

THE LANDPLAN COLLABORATIVE LTD.

128 Woolwich Street, Suite 204
Guelph, Ontario. N1H 3V2

The firm is involved in an examination of site design considerations for energy conscious development. The firm also considers wind and snow impacts using open water channel simulation.

Projects conducted by the firm in the area of climate research are as follows:

1. Site Design for Energy Conservation with particular consideration for wind environments (University of Guelph).

Refer also to Sections 1.0 and 15.0 for more information on the projects.

## CONSULTING AND ENGINEERING FIRMS (United States)

**THE RMH GROUP INC.**

Contact: Dr. Gary L. Porter

405 Urban Street, Suite 401
Denver, Colorado.
U.S.A. 80228
(303) 988-7720

The firm is a private company specializing in mechanical, electrical, and energy consulting engineering.

The types of projects completed varies and include:

1. Climatic analysis/residential design for Seattle, Wash. This project discusses how to properly design a residential structure to provide optimum energy consumption and human comfort.
2. Wind effects on structural design and energy consumption.
   This paper evaluated effects wind conditions have on the structural and energy performance of high rise buildings.
3. Building Climatology is a climatic classification for single family, single storey, residential building design.
4. Room location (design) in accordance with the Sol-Air temperature and solar heat gain to maximize both human comfort and energy consumption.
5. Analysis of heat penetration into structures in an attempt to develop envelopes that would be both energy conserving and economically feasible.

Future projects proposed by the firm include:

1. Expansion, updating, and further testing of climatic classification for building design.
2. Extensive research into Sol-Air temperature concept.
3. Heat transfer analysis of double envelope structures.
4. Research into development of "Zero Energy" structure.
5. Development of a more complete energy audit for residential structures.
6. Snow loading and heat transfer analysis through snow loaded roof elements.
7. Artificial daylighting analysis for residential dwellings in northern latitudes.

MANUFACTURING FIRMS (United States)

**CLIMATRONICS CORPORATION**

Contact: Brian L. O'Keefe

140 Wilbur Place, P.O. Box 480
Bohemia, New York.
U.S.A. 11716
(516) 567-7300

The firm is involved in the manufacuture of meteorological instrumentation. Examples of some of the products include:

1. Wind Mark III - a wind measuring system
2. Solar Powered Telemetered Station
3. Wind Sensors and Wind Component Systems

For further information on the company or products, Mr. H. Hohener should be contacted at M.I.C. Company, Division of Hohener Enterprises Ltd., 37 Maple Avenue, Thornhill, Ontario. (416) 889-6653.

## MANUFACTURING FIRMS (United States)

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GOVERNMENT (PROVINCIAL/STATE)

ONTARIO MINISTRY OF TRANSPORTATION & COMMUNICATIONS

Policy Planning & Research Div.
1201 Wilson Avenue
Downsview, Ontario. M3M 1J8
(416) 248-7296

Contact: T.G. Robbins

The Ministry of Transportation and Communications in conjunction with the Ontario Ministry of Energy have developed a "Drive: Propane" Demonstration Program in response to the province's exploration for ways to reduce dependence on petroleum-based products. This current project is designed to determine the costs and benefits of using propane as a transportation fuel. About 200 propane-powered vehicles from both private and government sectors will be monitored to assess performance costs and practical benefits.

# SECTION 18.0

# TRANSPORTATION

## ARCHITECTURAL FIRMS

**EDWARD R. BALDWIN ARCHITECT**

Contact: E.R. Baldwin

167 Richmond Street East
Toronto, Ontario. M5A 1N9
(416) 364-4521

The firm is involved in cold climate designs and research useful in architectural applications.

Year-round Live-aboard Yacht for Cold Climates. Preliminary design for the hull and interiors of a yacht was carried out in 1980 with R. Johnston, Naval Architect, of Niagara-on-the-Lake. The project is self-funded to-date. Estimated cost of the finished prototype is $250,000. The project is on hold pending improvement in economic conditions.

Future marine design projects include:

1. Barge-mounted Accommodation for Arctic projects.
2. Live-aboard Community for Northern Climates.

For other projects, see Section 14.2.

## CONSULTING AND ENGINEERING FIRMS

**CURRIE, COOPERS AND LYBRAND**
Contact: Nancy Pinnington

145 King Street West
Toronto, Ontario. M5H 1J8
(416) 366-1921

The firm assessed the regulatory environment influencing the sale of compressed natural gas as a transportation fuel. Our study identified key regulatory issues and developed recommendations which would lead to the removal of obstacles to the use of this fuel.

The management consulting firm is also involved in other areas of energy efficiency research. Refer also to Sections 5.0, 6.0 and 14.4.

**DILLON CONSULTING ENGINEERS/PLANNERS**
Contact: Daniel Paquette

47 Sheppard Avenue East
Willowdale, Ontario.
(416) 229-4646

The firm is involved with many aspects of energy-efficient designs.

Examples of projects in this area include:

1. Metropolitan Toronto Area Transportation Energy Study.
2. South March Energy Conserving Community.

## DEVELOPMENT AND CONSTRUCTION FIRMS

THE ARCTIC PILOT PROJECT

P.O. Box 6530, Station "D"
Calgary, Alberta. T2P 1H4
(403) 296-6378

Contact: R.A. Bailey

The Arctic Pilot Project is a joint venture between Petro-Canada, NOVA (an Alberta Corporation), Dome Petroleum, and Melville Shipping Limited. The project was begun in 1977 to develop a year-round transportation system for the movement of Arctic resources to southern markets. The Arctic Pilot Project will transport liquified natural gas from the Arctic to sourthern markets where it will be regasified, distributed, and consumed as conventional natural gas in the fuel market. Various federal, provincial and territorial governments as well as consultants have been involved in the project.

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## CONSULTING AND ENGINEERING FIRMS

BIRD AND HALE LTD.
Consulting Engineers
and Biologists

1263 Bay Street
Toronto, Ontario.
M5R 2C1
(416) 925-1147

617 Queen St.E., #215
Sault Ste. Marie, Ont
P6A 2A6
(705) 942-1640

The firm is comprised of engineers and biologists involved in airphoto interpretation, biophysical inventories and environmental assessments, refuse and solid waste systems, and remote sensing.

Project inventory:

1. Monitoring the energy requirements of a process which converts sewage sludge to earthworm castings for use as a soil extender and commercial potting soil. Other participants included Testing Labs at the University of Guelph and the Ontario Ministry of the Environment and the project was commissioned by the Vermicomposting Co. of Toronto.

DILLON CONSULTING ENGINEERS/PLANNERS

P.O. Box 1649
Yellowknife, N.W.T.
(403) 873-5151

M.M. Dillon Limited, a subsidiary of the Dillon firm, are consulting engineers for civil, environmental sciences, planning, transportation, water and waste projects.

Projects include:

1. Design of the Norman Wells Water Supply in the Northwest Territories.
2. Predesign report, design and supervision of the Water Supply System - Arctic Bay, Baffin Island.
3. Design and supervision of the Water Distribution System Improvements - Fort Simpson, N.W.T.

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# SECTION 19.0

# UTILITY AND SEWAGE SYSTEM DESIGN

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2. Predesign report, design and supervision of the Water Supply System - Arctic Bay, Baffin Island.
3. Design and supervision of the Water Distribution System Improvements - Fort Simpson, N.W.T.

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